geometry which guided geometrical thinking for about fifty years. According to his definition, geometry is the study of those properties of figures which remain unchanged when the figures themselves are subjected to the transformations of a certain group. The kind of geometry under consideration depends on what group of transformations is being used. For example, the classical *metric geometry* is the study of those properties of figures which are unchanged when the figures are *moved* from one place to another. In more precise words, metric geometry is the study of the properties of figures which are invariant under the group of rigid motions. Examples of metric invariants are the distance between two points, the angle between two lines, area, shape, size, and so on.

On the other hand, the more modern *projective geometry* is the study of those properties of figures which are invariant under the group of projections. From the point of view of projective geometry, the picture on the film in the projection machine at a motion picture show is precisely the same picture as that on the screen before the audience. To be sure, the pictures are *metrically different* because for instance they have different sizes, but they are *projectively identical*, because projective geometry recognizes the existence of only those properties which are unchanged by projection. An example of such a property is the straightness of a line; if a line is straight before projection it will be straight afterward. Another example is the *united position* of point and line; if a point is on a line before projection it will be on the line afterward. Still other projective invariants are the cross ratio of four points on a line, the harmonic separation of four collinear points or of four coplanar concurrent lines, and so on.

Other classifications of geometry, besides that of Klein, are possible. For instance, *integral* geometry, or geometry *in the large*, considers a figure as a whole, whereas *differential* geometry, or *infinitesimal* geometry as it is sometimes perhaps more properly called, considers a figure only in the neighborhood of one of its elements, say a curve in the neighborhood of one of its points. The ordinary definition of the tangent line at a point of a curve, as the limit of the secant line through this point and a neighboring point on the curve as the second point approaches the first along the curve, is of a differential character. The reason why only a neighborhood of the point of tangency need be known in order to define the tangent is found in the characteristic way in which the limiting process appears in the definition. Such limiting processes are fundamental in differential geometry, and explain why the use of the differential calculus is so very convenient.

Our two classifications of geometry can be made simultaneously. Consequently we may speak,of *metric differential* geometry, meaning geometry that is both metric and differential. Some of the familiar ideas of this geometry are tangent lines, osculants, normal lines, and curvatures of curves, as well as curvatures of surfaces, and various sorts of curves on surfaces, such as minimal lines, lines of curvature, asymptotic curves, conjugate nets of curves, and geodesics. In the same way, the name *projective differential geometry* is also precisely descriptive. This kind of geometry is characterized by being both *projective* and *differential*.

Since the group of projections contains as a subgroup the group of rigid motions, and since every invariant under a group is also an invariant under a subgroup of that group, it follows that all of projective geometry may properly be included in metric geometry, and that in particular all of projective differential geometry may be logically included in metric differential geometry. As a matter of history, many projective differential theorems appeared in metric differential geometry before projective differential geometry was organized as a separate science. If the metric differential geometer wishes to study projective differential geometry too, no one will object. In fact, one fruitful program of research has been to investigate metrically configurations that were first defined and studied projectively.

However, it becomes the task of the projective differential geometer to select from metric differential geometry the material that is actually projective. So he takes into his domain tangent lines, some of the osculants, asymptotic curves, and conjugate nets. When he must leave behind something, he sometimes invents or discovers an analogue to replace it; for instance, the metric normal at a point of a surface must be relinquished, but the so-called *projective normal* is discovered to replace it. Sometimes he generalizes; for instance, the osculating circle at a point of a curve suggests the osculating conic, and the osculating sphere suggests the osculating quadric surface. In a sense, projective geometry is simpler than metric geometry because there are fewer cases and less detail to be considered; as an illustration, instead of three metrically distinct types of conics, namely, the parabola, ellipse, and hyperbola, we have only one non-singular conic in projective geometry.

Geometry can be still further classified into *synthetic* geometry, which is pure geometry, and *analytic* geometry which is geometry studied by means of coordinate systems so that the powerful methods of analysis and algebra become available. Differential geometry can be studied by synthetic methods. Indeed the analytic geometer's work is not finished until his theorems are stated in a form that is independent of the coordinate system used. There are those that would insist that when a geometric theorem and its environment are fully understood the theorem must become intuitive and appear almost self-evident. Synthetic proofs can often eventually be given for theorems originally discovered by analytic methods.

Projective differential geometers have employed three closely related analytic methods, which may be referred to as the method of power series, the method of differential equations, and the method of differential forms. We shall discuss each of these in turn.

III. Power Series

Projective differential geometry may be said to have begun with the work of G. H. Halphen (1844–1889), who studied plane curves in 1878 and space curves in 1880. He based his work upon the consideration of certain differential invariants which appear as coefficients in certain canonical power series expan-

sions. Shifting the emphasis from the differential invariants to the power series themselves, we shall now explain in some detail how plane curves may be investigated, and shall indicate some other applications of the method.

In the plane a point P_x has three projective homogeneous coordinates x_1, x_2, x_3, which may be visualized as proportional to the distances of the point P_x from the sides of an arbitrarily chosen triangle, called *the triangle of reference*, each distance being measured in such a unit and given such a sign that an arbitrarily chosen point, called *the unit point*, not on a side of the triangle of reference, may have coordinates 1, 1, 1. When $x_1 \neq 0$, non-homogeneous projective coordinates x, y of the point P_x may be introduced by the definitions

$$x = x_2/x_1, \qquad y = x_3/x_1. \tag{1}$$

The notation will make it clear in any case which kind of coordinates is being used.

Let us consider a curve C in a plane, and write its equation in the form

$$y = f(x).$$

Let us suppose that C is *analytic*, so that in a neighborhood of an ordinary point P with coordinates $0, a_0$ on C, the curve C can be represented by a converging Taylor's series, of the form

$$y = a_0 + a_1x + a_2x^2 + a_3x^3 + \cdots . \tag{2}$$

This series could be used as it stands to study the projective differential geometry of the curve C at the point P. However, it is convenient to simplify it. A well-known principle of analytic geometry states that the more intimately the coordinate system is connected with the configuration under consideration, the simpler will be the equations of the configuration. This principle is illustrated in elementary analytics when the general equation of the second degree is reduced to a simple form by translation of the origin and rotation of the coordinate axes. We shall immediately illustrate it again by showing that the triangle of reference and unit point of our coordinate system can be chosen so that the series (2) will assume the simple form

$$y = x^2 + ax^5 + bx^7 + (2a^2 + b)x^8 + a_9x^9 + \cdots . \tag{3}$$

We begin the demonstration by choosing the vertex (1, 0, 0), or in non-homogeneous coordinates (0, 0), to be the point P on the curve C under consideration. Then in the series (2) we have $a_0 = 0$. Further, we make the side $x_3 = 0$ (or $y = 0$) coincide with the tangent line of C at P. Then $a_1 = 0$, since the line $y = 0$ must cut the curve C in two *consecutive* (coincident) points at P. Since P is supposed to be an ordinary point, we have $a_2 \neq 0$; in fact, the vanishing of a_2 would imply that P is an inflexion point or point of higher singularity.

Since a conic is determined by five points, *the osculating conic* at the point P of the curve C is defined to be the conic which has five consecutive points in common with C at P, just as the tangent line has two consecutive points in common with C at P. It is known that the equation of a conic can be reduced to

the form

$$y = x^2 \tag{4}$$

by suitable choice of coordinate system. In particular, the equation of the osculating conic can be reduced to this form. Since the osculating conic already passes through the vertex $P(1, 0, 0)$ tangent to the side $x_3 = 0$, it is sufficient to suppose that the side $x_1 = 0$ is tangent to the conic at the point $(0, 0, 1)$ distinct from P where the side $x_2 = 0$ intersects the conic, and to suppose that the unit point lies on the conic (see 7, p. 17). Then the equation of the osculating conic in non-homogeneous coordinates takes the form (4). Since this conic and the curve C have five consecutive points in common it follows that the series (2), with $a_0 = a_1 = 0$, when substituted in equation (4) must satisfy (4) identically in x as far as terms of degree four. Consequently we must have $a_2 = 1$, $a_3 = a_4 = 0$. It is now obvious on inspection that the series (2) and the equation (4) agree precisely to the term in x^5 in (2), but not including this term if $a_5 \neq 0$. In fact, if $a_5 = 0$, then the osculating conic intersects the curve C in at least *six* consecutive points at P, and P is a singular point of the kind called *sextactic point* or is some higher type of singularity. Since P is supposed to be an ordinary point we have $a_5 \neq 0$. For simplicity we drop the subscript 5 hereafter, and write the reduced form of (2) which we have now obtained,

$$y = x^2 + ax^5 + a_6x^6 + a_7x^7 + a_8x^8 + \cdots . \tag{5}$$

The unit point can still be any point distinct from P on the osculating conic, and the side $x_2 = 0$ (or $x = 0$) can be any line distinct from the tangent line $x_3 = 0$ (or $y = 0$) through P. In order to choose the line $x_2 = 0$, we proceed as follows. A plane cubic curve is determined by nine points. There is a single infinity (one-parameter family) of cubics that intersect the curve C in eight consecutive points at P. Such a cubic may be referred to as an *eight-point cubic*, since it has eight-point (or seventh order) contact with C at P, just as the osculating conic has five-point (or fourth-order) contact, and the tangent line has two-point (or first-order) contact. The reader may verify that the equation of the most general eight-point cubic is

$$\begin{aligned} &h[a(x^3 + ay^3 - xy) + a_6y(y - x^2)] \\ &\qquad + k[a(y - x^2 - axy^2 - a_6y^3) - a_7y(y - x^2)] = 0, \end{aligned} \tag{6}$$

where h, k are arbitrary parameters not both zero; it is sufficient to show that equation (6) is satisfied by the power series (5) for y identically in h, k and in x as far as terms of degree seven. The one of the eight-point cubics (6) for which $k = 0$ is the only one that has a node (or double point) at the point P, as can be verified by demanding that the derivative dy/dx calculated from (6) be indeterminate when $x = 0$, $y = 0$. This cubic is called *the eight-point nodal cubic* at the point P of the curve C. The equations of its nodal tangents are found, by setting equal to zero the terms of lowest degree in its equation, to be

$$y = 0, \qquad a_6y - ax = 0. \tag{7}$$

We now choose the side $x_2=0$ (or $x=0$) of the triangle of reference to be the second of these nodal tangents, i.e., the one distinct from the tangent line $y=0$. Thus we obtain $a_6=0$. The second nodal tangent, whose equation is now $x=0$, has been called *the projective normal* at the point P of the curve C, and used to replace the metric normal. We remark that ordinarily $a_7 \neq 0$, and replace a_7 by b for simplicity.

Finally, in order to choose the unit point, we proceed as follows. Among the eight-point cubics (6) there is just one osculating (or nine-point) cubic, which may be shown by the method now familiar to be the one for which

$$hb + k(2a^2 - a_8) = 0. \tag{8}$$

The osculating cubic and the osculating conic (4) intersect in six points, of course, but five of them are coincident at P. The coordinates of the intersection point distinct from P are found, by solving two equations simultaneously, to be

$$b/(a_8 - 2a^2), \qquad b^2/(a_8 - 2a^2)^2.$$

We now choose the unit point to be this point. Thus we obtain

$$a_8 = 2a^2 + b,$$

and so the reduction of the series (2) to the form (3) is complete. No further reduction is possible. The study of the projective differential geometry of the plane curve C in the neighborhood of the ordinary point P may be based on the series (3), in which all the coefficients are absolute invariants. Any further equation connecting them expresses a projective geometrical theorem about the curve C in the neighborhood of the point P (see 7, §4).

Without entering into details we merely state that the two equations of a curve in ordinary space of three dimensions can be reduced by a method similar to that just used in the case of a plane curve to the canonical form (see 7, §5, §6)

$$\begin{aligned} y &= x^2 + ax^7 + bx^8 + \cdots, \\ z &= x^3 + x^6 + cx^7 + dx^8 + \cdots. \end{aligned} \tag{8}$$

Moreover, the equation of a non-ruled surface in ordinary space can similarly be reduced to

$$z = xy + (x^3 + y^3)/6 + (Ix^4 + Jy^4)/24 + \cdots, \tag{9}$$

or if we please to

$$z = xy + (x^3 + y^3)/6 + (Jx^3y + Ixy^3)/12 + \cdots, \tag{10}$$

or to still other forms.

IV. Differential Equations

The first mathematician the major part of whose scientific career was devoted to projective differential geometry was E. J. Wilczynski (1876–1932). Beginning about 1901 he developed a new method in this field which may be

called the method of differential equations. We shall not need to formulate this method here in its most general form (see 7, p. 9, Ex. 2, p. 28; p. 64; p. 286), but will at once explain how it is used in studying plane curves, and will then see what extensions are necessary for studying surfaces in ordinary space.

Let the projective homogeneous coordinates x_1, x_2, x_3 of a point P_x be given as analytic functions of an independent variable t by equations of the form

$$x_i = x_i(t) \qquad (i = 1, 2, 3). \tag{11}$$

When t varies the locus of the point P_x is a curve C_x, of which equations (11) are the parametric equations. We suppose that the curve C_x does not degenerate into a single fixed point, and further that C_x is not a straight line.

It is possible to determine the coefficients p_i of an ordinary third-order linear homogeneous differential equation, of the form

$$x''' + 3p_1x'' + 3p_2x' + p_3x = 0, \tag{12}$$

as functions of t so that the coordinates x_i will be a fundamental system of solutions of the equation. For this purpose let us substitute the coordinates x_i one at a time in (12) with the coefficients p_i regarded as unknown. The resulting three linear algebraic equations can be solved for the p_i since the determinant of their coefficients is not zero, in virtue of the fact that the curve C_x is a proper curve not a straight line. Then C_x is called *an integral curve* of the equation (12), and (12) is spoken of as *a differential equation* of C_x.

But the differential equation (12) has many integral curves, which are all obtained by transforming C_x by a non-singular projective transformation whose equations are of the form

$$\begin{aligned} y_1 &= a_{11}x_1 + a_{12}x_2 + a_{13}x_3, \\ y_2 &= a_{21}x_1 + a_{22}x_2 + a_{23}x_3, \\ y_3 &= a_{31}x_1 + a_{32}x_2 + a_{33}x_3, \end{aligned} \tag{13}$$

in which the coefficients a_{ij} are constants. To convince oneself of this, one first of all observes that the point P_y whose coordinates are y_1, y_2, y_3 generates a curve C_y when t varies. This curve C_y is by definition a projective transform of C_x. That C_y is an integral curve of the differential equation (12) may be inferred at once from the theory of linear differential equations, or may be verified directly by proving that each of y_1, y_2, y_3 is a solution of (12) and that these solutions are linearly independent. So all projective transforms of C_x are integral curves of (12). Conversely, the theory of linear differential equations tells us that the most general integral curve or (12) may be obtained by transforming projectively any particular one.

The reason why a theory of the integral curves of the differential equation (12) is a projective theory is now apparent. It must be a projective theory because it is impossible by means of the equation to distinguish between the integral curves. Only such properties of the curves can be studied

as are common to them all, i.e., are invariant under projective transformation.

It should be observed that the differential equation (12) depends on more than just the curve C_x. In the first place, the equation depends on the proportionality factor of the homogeneous coordinates. The transformation

$$\lambda x_i = \xi_i \qquad (i = 1, 2, 3)$$

certainly would not change the curve C_x, since the curve C_ξ is the same curve merely denoted differently; but this transformation ordinarily would change the equation (12). Moreover, the equation depends on the parameter, or independent variable, used. The transformation of parameter from t to u,

$$t = t(u) \qquad (dt/du \neq 0)$$

leaves the curve C_x unchanged but ordinarily would change the equation. So we make the total transformation

$$\lambda x = \xi, \qquad t = t(u) \qquad (\lambda \neq 0,\ dt/du \neq 0) \tag{14}$$

on equation (12) and get another equation of the same form.

The *invariants* of the equation (12) under the transformation (14) are defined to be those functions of the coefficients p_i and their derivatives which are unchanged, except possibly for a factor depending only on the transformation. Any absolutely invariant equation connecting these invariants expresses a projective property of an integral curve C_x, and conversely every such property can be so expressed. The *covariants* of the equation (12) under the transformation (14) are defined to be those functions of the coefficients p_i and their derivatives and also of x and the derivatives of x which are similarly invariant. When the three coordinates x_1, x_2, x_3 are substituted one at a time in a covariant, the three values thus obtained for the covariant are the coordinates of a covariant point which is geometrically definable in terms of the curve C_x and the point P_x. When the parameter t varies, the covariant point generates a covariant curve which has its points in one-to-one correspondence with the points of the curve C_x, and which may be geometrically defined in terms of C_x. Conversely, every such curve can be so represented. The method of Wilczynski as applied to plane curves (see 1, Chap. III) consists in studying the curve C_x by means of the invariants and covariants of the differential equation (12) under the transformation (14). The same method can be employed for studying curves in ordinary space (see 1, Chap. XIII) and curves in n-space (see 1, Chap. II). Moreover, this method can easily be connected with the method of power series (see 1, p. 62).

Ruled surfaces, i.e., surfaces consisting of one-parameter families of straight lines, are of considerable interest in projective differential geometry. Such a surface is called *developable* if its generators (straight lines) are tangent to a curve. A non-developable ruled surface in ordinary space is studied (see 1, Chap. IV et seq., or else 7, §§11–14) according to the method under consideration by means of the invariants and covariants of a system of ordinary equations of

the form

$$y'' + p_{11}y' + p_{12}z' + q_{11}y + q_{12}z = 0,$$
$$z'' + p_{21}y' + p_{22}z' + q_{21}y + q_{22}z = 0, \tag{15}$$

under a transformation of the form

$$y = \alpha\eta + \beta\zeta, \qquad z = \gamma\eta + \delta\zeta, \qquad t = t(u). \tag{16}$$

When we come to study non-ruled analytic surfaces in ordinary space a new complication arises. The fundamental equations are partial differential equations, and consequently *integrability conditions* appear, which we proceed to explain.

Let us consider in ordinary space a proper surface S, whose parametric equations are

$$x_i = x_i(u, v) \qquad (i = 1, 2, 3, 4). \tag{17}$$

Let it be supposed that the parametric curves, i.e., the u-curves for which v=const. and the v-curves for which u=const., are not too specially chosen; specifically, let the parametric curves not form a conjugate net. Then it can be shown that the four functions x_i satisfy a system of equations of the form

$$x_{uu} = px + \alpha x_u + \beta x_v + Lx_{uv},$$
$$x_{vv} = qx + \gamma x_u + \delta x_v + Nx_{uv}, \tag{18}$$

in which the coefficients are functions of u, v and subscripts indicate partial differentiation. In fact, the parametric curves form a conjugate net if, and only if, the coordinates x_i are solutions of a Laplace equation of the form (see 7, Chap. IV; see also 2, especially, p. 51)

$$x_{uv} = ax_u + bx_v + cx.$$

The theory of this and associated equations constitutes the very significant chapter on conjugate nets in projective differential geometry, which we dismiss with this mention. Since we are now supposing that no such equation is satisfied by the coordinates x_i, it follows that substituting the coordinates x_i one at a time in the first of equations (18) with the coefficients p, α, β, L regarded as unknown leads to four linear algebraic equations which can be solved for these coefficients. Similarly the coefficients of the second of equations (18) can be determined.

The differential equations (18) can be simplified in the following way. Let us recall that an asymptotic curve on a surface is a curve such that its osculating (or three-point) plane at each of its points is the tangent plane of the surface at the point. It is known that there is a net (two one-parameter families) of asymptotic curves on our surface. Let us take them for the parametric curves. Then it can be shown, by a very simple argument which will be omitted, that $L=N=0$.

Let us now consider the reduced system of equations

$$x_{uu} = px + \alpha x_u + \beta x_v,$$
$$x_{vv} = qx + \gamma x_u + \delta x_v. \tag{19}$$

It is easy to see that each of the third partial derivatives of x can be calculated from (19) and expressed in just one way as a linear combination of x, x_u, x_v, x_{uv}. But some of the fourth derivatives can be calculated in more than one way. Since, however, we are dealing with analytic functions, the two methods of calculation must give rise to identical results. So from the equation

$$(x_{uu})_{vv} = (x_{vv})_{uu}$$

we obtain an equation of the form

$$Ax_{uv} + Bx_u + Cx_v + Dx = 0, \tag{20}$$

which must be satisfied by the four functions x_i. But since we are considering a proper surface S on which the parametric curves do not form a conjugate net, it follows that we must have (see 7, Chap. III)

$$A = B = C = D = 0. \tag{21}$$

These are the integrability conditions of system (19). We shall not calculate them explicitly here. They are partial differential equations which must be satisfied by the coefficients of system (19). Conversely, any system of the form (19) for which the integrability conditions (21) are satisfied is said to be *completely integrable*. Such a system possesses four linearly independent solutions, and its most general solution is a linear combination of these with constant coefficients. Consequently such a system defines a surface in ordinary space except for a projective transformation.

The reader who is familiar with the metric differential geometry of surfaces will observe that system (19) is closely related to the system composed of the three differential equations of Gauss and the two of Weingarten satisfied by the cartesian coordinates of a point on a surface and the direction cosines of the normal to the surface at the point. The latter system has three integrability conditions, namely, the one condition of Gauss and the two of Codazzi.

The method of differential equations as explained above can easily be connected with the method of power series, but we shall not make the connection here (see 7, §17), nor shall we attempt even to mention all the situations in which the method may be employed.

V. Differential Forms

The analytic approach to projective differential geometry by means of differential forms (homogeneous polynomials in differentials) is due to G. Fubini (1879–), whose investigations in this field began about 1914. This method finds perhaps its best illustration in the theory of non-ruled surfaces referred to their asymptotic curves in ordinary space, but is in fact very widely applicable (see 5).

Let us again think of the situation in metric differential geometry. There one could organize the theory of surfaces by starting with the five differential equations of Gauss and Weingarten, subject to the three integrability conditions of Gauss and Codazzi. These determine a surface except for its position in space. Eventually there would appear two quadratic differential forms which can be written

$$Edu^2 + 2Fdudv + Gdv^2, \qquad Ldu^2 + 2Mdudv + Ndv^2. \tag{22}$$

The first of these vanishes for the minimal curves and the second for the asymptotic curves on the surface. This would be the method of differential equations.

However, Gauss did not develop the metric theory this way, and this is not the usual way. Usually the differential forms (22) appear before the differential equations, and are called the *fundamental quadratic differential forms*. The *fundamental* theorem then asserts that when these forms are given with coefficients that are functions of u, v satisfying the Gauss-Codazzi conditions, they determine a surface *except for position* in ordinary space. This in brief is the method of differential forms as applied in the metric theory.

Fubini considered the problem of defining a surface by differential forms, *except for a projective transformation* in ordinary space, and reached in particular the following result. Let us consider three differential forms, two quadratic and one cubic, which can be written

$$2\beta\gamma dudv, \qquad 2\beta\gamma(\beta du^3 + \gamma dv^3), \qquad pdu^2 - qdv^2. \tag{23}$$

Let the coefficients β, γ, p, q be functions of u, v satisfying the three following *integrability conditions* (see 7, p. 69 and p. 289; see also 3, vol. I, p. 94; or see 5, p. 83):

$$\begin{aligned} \theta_{uvv} &= (\gamma\phi)_u + 2q_u + \theta_v\theta_{uv} - \beta\gamma\psi, \\ \theta_{uuv} &= (\beta\psi)_v + 2p_v + \theta_u\theta_{uv} - \beta\gamma\phi, \\ p_{vv} - \theta_v p_v + \beta q_v + 2q\beta_v &= q_{uu} - \theta_u q_u + \gamma p_u + 2p\gamma_u, \end{aligned} \tag{24}$$

where

$$\theta = \log \beta\gamma, \qquad \phi = (\log \beta\gamma^2)_u, \qquad \psi = (\log \beta^2\gamma)_v. \tag{25}$$

Then the forms (23) determine a non-ruled surface referred to its asymptotic curves in ordinary space, except for a projective transformation. To connect this result with the method of differential equations we may observe that it can be shown that the surface is an integral surface of the following system of differential equations, of which the equations (24) are the integrability conditions:

$$\begin{aligned} x_{uu} &= px + \theta_u x_u + \beta x_v, \\ x_{vv} &= qx + \gamma x_u + \theta_v x_v. \end{aligned} \tag{26}$$

In conclusion we may point out a few analogies between the metric and pro-

jective theories of surfaces. The normal line at a point of a surface, which plays such an important rôle in the metric theory, has no place in the projective theory, and the problem arose to find a substitute which had as many of the desirable properties of the metric normal as possible. After an interesting period of research G. M. Green of Harvard and G. Fubini in Italy almost simultaneously found what is now called the *projective normal* (see 7, §20). The geodesic curves of the metric theory are not of a projective character, but they have suggested various investigations and generalizations in the projective theory. Further, in the metric theory the parametric net is said to be *isothermally orthogonal* in case the coefficients of the first of the forms (22) satisfy the conditions

$$F = 0, \qquad (\log E/G)_{uv} = 0.$$

The analogous definition of an *isothermally conjugate net* is, in terms of the coefficients of the second of the forms (22),

$$M = 0, \qquad (\log L/N)_{uv} = 0.$$

The problem of finding the geometric significance of isothermal conjugacy led to extensive investigations. Again, in the metric theory two surfaces are said to be *applicable* under certain conditions, which can be reduced to saying that they have the same E, F, G. Analogously, two surfaces are said to be *projectively applicable* (see 5, Chap. VI) in case they satisfy certain conditions, which can be reduced to saying that they have the same β, γ in the notation of (23). Finally, the well-known theorem of Meusnier, to the effect that the osculating circles of all plane sections at a point of a surface, made by planes through a tangent line at the point, lie on a sphere has as a projective analogue the theorem of Moutard to the effect that the osculating conics of all plane sections at a point of a surface, made by planes through a tangent line at the point, lie on a quadric surface.

This is not the place to describe other projective differential investigations, such as the extensive studies of rectilinear congruences and complexes, the study of surfaces and hypersurfaces in hyperspace, and so on. There is already a voluminous literature on these and other topics, and it is still growing.

References

1. E. J. Wilczynski, *Projective Differential Geometry of Curves and Ruled Surfaces*, Leipzig, Teubner, 1906.
2. G. Tzitzéica, *Géométrie différentielle projective des réseaux*, Bucarest, Académie roumaine, 1923.
3. G. Fubini e E. Čech, *Geometria proiettiva differenziale*, Bologna, Zanichelli, Tom. I, 1926, Tom. II, 1927.
4. E. Čech, *Projektivní diferencialní geometrie*, V Praze, Jednoty Československých Matematiků a Fysiků, 1926.
5. G. Fubini et E. Čech, *Introduction à la géométrie projective différentielle des surfaces*, Paris, Gauthier-Villars, 1931.
6. G. Tzitzéica, *Introduction à la géométrie différentielle projective des courbes* (Mémorial des Sciences Mathématiques, Fasc. 47), Paris, Gauthier-Villars, 1931.
7. E. P. Lane, *Projective Differential Geometry of Curves and Surfaces*, Chicago, University of Chicago Press, 1932.

THERMODYNAMICS—AN EXPOSITION

By J. E. TREVOR, Cornell University

I. *The Laws of Thermodynamics*[1]

1. *Introductory.* This expository paper is intended to outline the chain of reasoning by which the general principles of thermodynamics are established, and to outline a systematic mode of application of these principles to an important class of physical phenomena. Thermodynamics has an especial interest because of the fact that the hypotheses underlying it are susceptible of experimental verification, and this interest makes it desirable that the logical structure of the theory be carefully studied. A notable departure from the usual plan of development of the general theory has been proposed by Carathéodory in a paper[2] in which he undertakes to proceed without presupposing the existence of measureable quantities of "heat," and without utilizing the "temperature" readings of an arbitrary thermometric scale. Instead of proceeding in this way I have chosen to follow the traditional course of development, taking temperatures and quantities of heat as given. An effort has been made to distinguish reasoning on physical grounds from mathematical deductions; to emphasize the postulates employed; and to bridge apparent gaps in the argument as usually presented. It will be well to begin with definitions of some terms that might otherwise be misunderstood.

2. *Definitions.* A *body* is a definite material object. A given pound of water and half-ounce of table salt together constitute a body; a pound of a mixture of salt and water, in which the masses of the components are in a varying ratio, is not a body.

The *temperature* of a given body, when uniform, is the scale-reading of a given thermometer in thermal equilibrium with the body. The calibration of the thermometer is arbitrary, except that the readings must rise continuously with increasing hotness. At a given instant the temperature of a body may be non-uniform.

The *quantity of heat* added to a body in a given thermal operation is defined, in the familiar way, with reference to the use of a calorimeter. If this quantity is negative, the heat is abstracted from the body.

The set of *thermodynamic states* of a body is the set of physical states that can be reached, one from another, by transfers of work and heat to the body. A *change of thermodynamic state* of a body is a transformation of one thermodynamic state into another. It is determined by the end states. The *path* of a change of state is the set of intermediate states.

When a body has a uniform constant temperature and all its parts are at rest, it is in a state of *thermodynamic equilibrium*. For it is then in thermal and in dynamic equilibrium with the contiguous bodies.

---

[1] Part II, *An Application of the Laws of Thermodynamics*, will appear in the next issue of the MONTHLY.

[2] Mathematische Annalen, vol. 67 (1909), p. 355.

The states of thermodynamic equilibrium of a given body form in general distinct continuous *regions* of states. Thus a region of states of coexistent liquid and vapor in evaporation equilibrium is distinct from the region of states of homogeneous fluid, from a region of states of coexistent liquid and solid in fusion equilibrium, and from a region in which solid, liquid, and vapor coexist.

3. *The Energy Law.* It is a familiar experimental fact that any expenditure of work against friction or viscosity produces a quantity of heat proportional to the work expended. It follows that every absorption or development of heat by a body has a mechanical aspect, in that an absorption can be imagined effected by a mechanical operation, and a development can be imagined replaced by one. Hence quantities of work and of heat can be expressed in the same unit. Henceforth they will be so expressed.

The "First Law of Thermodynamics" is the statement that the algebraic sum of the work and heat absorbed by a body in any change of its thermodynamic state is independent of the path of the change of state. Since this principle is justified by extended and exact agreement of its consequences with experience, it is to be regarded as an experimentally established fact. It follows that the sum of the work W_{ab} and the heat Q_{ab} absorbed by a body in the change of its state from any state a to any other state b, on any possible path, is equal to the corresponding change of value $E_b - E_a$ of a single-valued function E of any independent variables that can be employed to determine the states,

$$W_{ab} + Q_{ab} = E_b - E_a. \tag{1}$$

The function E is termed the *energy* of the body. Since sufficiently small changes of the independent variables (of the state) effect arbitrarily small changes of E, this function may be considered to be continuous. The equation (1) formulates the *energy law.* The energy E, since it contains an arbitrary additive constant, is set equal to zero at an arbitrarily selected state of reference.

4. *Sequences.* When a continuous one-dimensional set of states of thermodynamic equilibrium connecting states a and b of a body is the limit approached by a family of paths of the change of state ab, and also by a family of paths of the reversed change of state ba, when these changes of state are conducted with increasing slowness under the influence of the independently controlled imposed forces and temperature, the set is termed a *reversible path* of either change of state. And the limits of the quantities of work and heat absorbed on the paths of the change ab, which are equal to the negatives of the limits of the work and heat absorbed on the paths of the change ba, as the limiting path is approached, are termed the work and heat absorbed *on the reversible path* ab, or developed *on the reversible path* ba.

When a body B undergoes a change of state in which no heat is transferred to or from B, the path of the change is *adiabatic.* Any reversible cyclic change of state conducted on an isothermal path followed successively by an adiabatic, another isothermal, and a concluding adiabatic path, is a *Carnot cycle.* Any reversible isothermal absorption or development of heat can be one of the iso-

thermal stages of such a cycle. When a body traverses a Carnot cycle, it absorbs x units of heat at a temperature t_1, it absorbs a net amount of W units of work, and it develops Q units of heat at a temperature t_2. Since the change of energy of the body is equal to zero, these quantities are connected by the relation,

$$x + W = Q.$$

Although this is not the place to demonstrate the statement, it should be noted that it is possible to devise Carnot cycles for which x is either positive or negative or equal to zero, while t_2 is either greater than t_1 or less than t_1 or equal to t_1.

Let the ith cycle of a set of Carnot cycles absorb heat x_i at a temperature t_{i1}, operate between temperatures t_{i1} and t_{i2}, and develop heat Q_i at t_{i2}, where $i=1, 2, \cdots, n$. When $n=1$, and when $n>1$ and the conditions

$$t_{i1} = t_{i-1,2}, \qquad x_i = Q_{i-1}, \qquad i = 2, 3, \cdots, n,$$

are satisfied, the set of cycles will be termed a *sequence*. When W is the total work absorbed in the operation of the cycles of the sequence, the energy law yields the relation,

$$x_1 + W = Q_n. \tag{2}$$

5. *The Second Law.* We now come to the "Second Law of Thermodynamics," which is the statement that an absorption of heat by a body maintaining a uniform temperature cannot be effected at the sole expense of a development of heat by a body maintaining a lower uniform temperature. In the words of Clausius, "Heat cannot of itself pass from a colder body to a warmer one."

A consequence of this law is the theorem that work cannot be gained at the sole expense of a development of heat by a body maintaining a uniform temperature. For, if a mechanism M absorbed x units of work at the sole expense of a development of x units of heat by a body A, an expenditure of this quantity of work by M against friction or viscosity in a body B, whose temperature exceeds that of A, would effect an uncompensated transfer of heat from A to the warmer body B. But the possibility of this result is excluded by the second law.

6. *The Work Absorbed by a Sequence.* Let any sequence operated between the arbitrary terminal temperatures t_1 and t_2, as recorded on an arbitrary scale of temperatures, absorb x units of heat at t_1, absorb a net amount of W units of work, and develop Q units of heat at t_2. When $t_2>t_1$, and the sequence is so operated that x is positive, which is always possible when $x\neq 0$, we have by (2) that Q, W, and the arbitrary positive constant x satisfy

$$Q = x + W.$$

There are five possibilities:

$$W < -x, \quad W = -x, \quad -x < W < 0, \quad W = 0, \quad W > 0.$$

The first four of these can easily be shown to involve violation of the second law. Further application of the second law proves, also, that $W=0$ when $x=0$, and that $W=0$ when $t_2=t_1$. We thus find the theorem:

I. *The quantity W has the sign of x when* $x\neq 0$ *and* $t_2>t_1$*; but* $W=0$ *when* $x=0$, *and* $W=0$ *when* $t_2=t_1$.

By application of the second law, and use of theorem I, it can easily be shown that the work W is independent of all circumstances except the given values of the independent x, t_1, t_2, and that it is uniquely determined by these values. Hence, when we take it to be physically obvious that W is a continuous function, the *physical* reasoning employed in studying the operation of any sequence yields the *mathematical* statement:

II. *The work W absorbed by any sequence absorbing heat x at a temperature* t_1 *and operating between temperatures* t_1 *and* t_2 *is a single-valued continuous function* $W(x, t_1, t_2)$ *of the independent x,* t_1, t_2*; and* $W(x, t_1, t_2)$ *vanishes for* $x=0$, *and for* $t_2=t_1$.

The physical reasoning employed in this section, and also in the following sections 7 and 8, makes use of reversible isothermal transfers of heat to and from an auxiliary body having a constant volume. This is permissible, since we can imagine the employment of a body of such extent that the change of its temperature consequent on a transfer of a given quantity of heat is less than any assignable amount.

7. *The Form of* $W(x, t_1, t_2)$ *in* x. We now seek the form of dependence of W upon x. The operation of any two sequences absorbing the respective arbitrary quantities of heat x and Δx at t_1, and operating between t_1 and t_2, can be coupled with that of a sequence absorbing the heat $x+\Delta x$ at t_1 and operating between the same temperatures. The second law is then easily shown to require

$$W(x, t_1, t_2) + W(\Delta x, t_1, t_2) = W(x + \Delta x, t_1, t_2).$$

The solution of this familiar functional equation is $W=f(t_1, t_2)x$, wherefore $f=W(1, t_1, t_2)$. So the form of W in x is expressed by the identity

$$W(x, t_1, t_2) = W(1, t_1, t_2)x.$$

We thus observe that the ratios W/x and Q/x are single-valued continuous functions of t_1, t_2. This statement involves the *Theorem of Carnot*, that the "efficiency"

$$\frac{W}{Q} = \frac{W(1, t_1, t_2)}{1 + W(1, t_1, t_2)}$$

of a Carnot cycle (more generally, of a sequence) is a function of the temperatures between which the cycle operates.

8. *The Form of* $W(x, t_1, t_2)$ *in* t_1, t_2. It remains to investigate the dependence of $W(1, t_1, t_2)$ on t_1 and t_2. We are to give an arbitrary increment t_3-t_2 to the temperature interval t_2-t_1 through which the sequence operates, whereby the function receives an increment

$$W(1, t_1, t_3) - W(1, t_1, t_2).$$

Consider any sequence absorbing heat 1 at t_1 and operated in an initial stage from t_1 to t_2 followed by a concluding stage from t_2 to t_3, where t_1, t_2, t_3 are arbitrary. Since the heat absorbed at t_2 in the concluding stage is $1+W(1, t_1, t_2)$, it follows that the work-absorption of this stage is $W(1, t_2, t_3)[1+W(1, t_1, t_2)]$. Now the work-absorption of the sequence is equal to the work-absorption $W(1, t_1, t_3)$ of any sequence absorbing heat 1 at t_1 and operating between t_1 and t_3,

$$W(1, t_1, t_3) = W(1, t_1, t_2) + W(1, t_2, t_3)[1 + W(1, t_1, t_2)]. \tag{3}$$

This is a functional equation for W.

For convenience of reference in solving (3), let us assemble the necessary foregoing results.

(A) x and W have the same sign when $x \neq 0$ and $t_2 > t_1$.

(B) $W(x, t_1, t_2)$ is equal to zero for $t_2 = t_1$.

(C) W has the form $W(1, t_1, t_2)x$.

(D) $Q = [1+W(1, t_1, t_2)]x$.

On adding unity to each member of (3), and factoring the second member, we obtain

$$1 + W(1, t_1, t_3) = [1 + W(1, t_1, t_2)][1 + W(1, t_2, t_3)]. \tag{4}$$

This equation is in terms of the quantity $1+W(1, t_i, t_j)$, which by (D) is equal to the single-valued continuous function Q of x, t_i, t_j for $x=1$. If we write $q(t_i, t_j)$ for the function $Q(1, t_i, t_j)$, we define q by the identity

$$q(t_i, t_j) = 1 + W(1, t_i, t_j)\ ; \tag{5}$$

whereupon the functional equation (4) becomes

$$q(t_1, t_3) = q(t_1, t_2)q(t_2, t_3), \tag{6}$$

which is a functional equation for q.

By (B) we have $W(x, t_1, t_2) = 0$ for $t_2 = t_1$. For $x=1$, $i=1$, and $j=2$, this converts (5) to

$$q(t_1, t_2) = 1, \qquad t_2 = t_1. \tag{7}$$

If now in (6) we put $t_3 = t_1$, and make use of (7), we obtain

$$q(t_1, t_2)q(t_2, t_1) = 1. \tag{8}$$

Interpreted physically, $q(t_2, t_1)$ is the heat developed at t_1 by any sequence absorbing heat 1 at t_2 and operating between t_2 and t_1.

By (8) and (5),

$$q(t_1, t_2) = \frac{1}{q(t_2, t_1)} = \frac{1}{1 + W(1, t_2, t_1)}.$$

When $t_2 < t_1$ we have by (A) that $W(1, t_2, t_1)$, having the sign of $x=1$, is positive.

Hence

$$t_2 < t, \qquad 0 < q(t_1, t_2) < 1. \tag{9a}$$

When $t_2 = t_1$ we have by (B) that $W(1, t_2, t_1) = 0$. Hence

$$t_2 = t_1, \qquad q(t_1, t_2) = 1. \tag{9b}$$

Finally, when $t_2 > t_1$ we have by (A) that $W(1, t_1, t_2)$ is positive. Hence $q(t_1, t_2) = 1 + W(1, t_1, t_2)$ is greater than unity,

$$t_2 > t_1, \qquad q(t_1, t_2) > 1. \tag{9c}$$

Putting $t_3 = a$ in (6), where a is an arbitrary constant, and then using (8),

$$q(t_1, t_2) = \frac{q(t_1, a)}{q(t_2, a)} = \frac{q(a, t_2)}{q(a, t_1)}. \tag{10}$$

If we define a function $\theta(t)$ by

$$\theta = q(a, t), \tag{11}$$

the equation (10) becomes

$$q(t_1, t_2) = \frac{\theta(t_2)}{\theta(t_1)}. \tag{12}$$

By the equations (9), q is positive. Hence, by (11), θ is positive for any realizable temperature t. Again, by (9c), $q(t_1, t_2) > 1$ for $t_2 > t_1$, wherefore by (12)

$$\frac{\theta(t_2)}{\theta(t_1)} > 1, \qquad t_2 > t_1.$$

Hence θ is an increasing function. Thus θ is a positive, increasing, single-valued, continuous function of t.

The form of the function W is now determined. By (C), (5), and (12), we have

$$W = W(1, t_1, t_2)x = [q(t_1, t_2) - 1]x = \left(\frac{\theta(t_2)}{\theta(t_1)} - 1\right)x.$$

So the form of W is expressed by the identity

$$W(x, t_1, t_2) = \frac{\theta(t_2) - \theta(t_1)}{\theta(t_1)}\, x. \tag{13}$$

9. *Definition of the Absolute Temperature.* Since $q(t_1, t_2)x = [1 + W(1, t_1, t_2)]x = Q(x, t_1, t_2)$, the equation (12) is

$$\frac{Q}{x} = \frac{\theta(t_2)}{\theta(t_1)}.$$

Since the ratio Q/x is a function of t_1 and t_2, it is employed to determine the

ratio $\theta(t_2)/\theta(t_1)$ of the "absolute" temperatures at which the transfers of heat Q and x occur. A definition of the absolute temperature $\theta(t)$ is now obtained if we let t_1 be a fixed temperature of reference t_r, for which the freezing temperature of water is chosen, and let t_2 be the general temperature t. Hereupon (12) becomes

$$q(t_r, t) = \frac{\theta(t)}{\theta(t_r)}. \tag{14}$$

To fix the value of the arbitrary constant $\theta(t_r)$, the absolute temperature of freezing water, we assign Δ units of absolute temperature to a fixed interval of temperatures, for which the interval from t_r to the boiling temperature t_s of water is chosen. Setting

$$\theta(t_s) - \theta(t_r) = \Delta,$$

and writing (12) for this temperature interval, we obtain

$$q(t_r, t_s) = 1 + W(1, t_r, t_s) = \frac{\theta(t_s)}{\theta(t_r)}.$$

On writing W_{rs} for the constant $W(1, t_r, t_s)$, and eliminating $\theta(t_s)$, we get

$$\theta(t_r) = \frac{\Delta}{W_{rs}}.$$

Substituting this value in (14), and replacing $q(t_r, t)$ by its value $1 + W(1, t_r, t)$ we find

$$\theta(t) = \frac{\Delta}{W_{rs}}[1 + W(1, t_r, t)].$$

This equation defines the absolute temperature $\theta(t)$ as a linear function of the work absorbed by any sequence that absorbs one unit of heat at the temperature of reference t_r and operates from t_r to the general realizable temperature t. It is a positive, increasing, single-valued, continuous function of t.

10. *A Theorem about an Auxiliary Body of Gas.* On multiplying the first member of (12) above and below by x, and writing Q_1 for the heat x *absorbed* at t_1 and Q_2 for the heat $-Q$ *absorbed* at t_2 by any Carnot cycle operating between t_1 and t_2, we find that Q_1, Q_2 and the corresponding temperatures are connected by the relation

$$\frac{Q_1}{\theta(t_1)} + \frac{Q_2}{\theta(t_2)} = 0. \tag{15}$$

We now assume that the realizable aeriform states of equilibrium of a body of hydrogen are in continuous one-to-one correspondence with the points of a region of the V, t plane, where V and t are the volume and temperature of the

body; that the uniform and normally directed pressure p and the energy E of the body are single-valued continuous functions of V, t, and possess continuous derivatives,

$$\frac{\partial p}{\partial t}, \quad \frac{\partial E}{\partial V}, \quad \frac{\partial E}{\partial t}, \quad \frac{\partial^2 E}{\partial V \partial t};$$

and that the body absorbs or develops work only under the action of the pressure p. And we assume that, within any area of the region in the V, t plane, it is always possible to describe a Carnot cycle.

The work added to the body in any reversible change of its state from any state a to any other state b is the line integral $W_{ab} = -\int p dV$, taken along the path of the change of state. From the energy law

$$E_b - E_a = W_{ab} + Q_{ab},$$

we thus find that the heat Q_{ab} absorbed on the path is

$$E_b - E_a + \int p dV,$$

which is the corresponding line integral of the inexact differential expression $dE + p dV$, or

$$\left(\frac{\partial E}{\partial V} + p\right) dV + \frac{\partial E}{\partial t} dt. \tag{16}$$

Hence a formulation of (15) for any Carnot cycle described within the given region R of states is

$$\int_{cc} \left[\frac{1}{\theta}\left(\frac{\partial E}{\partial V} + p\right) dV + \frac{1}{\theta}\frac{\partial E}{\partial t} dt\right] = 0, \tag{17}$$

where the double subscript indicates that the line integral is taken along the contour of any Carnot cycle in the region.

Now let us consider this line integral, taken along *any* closed contour C in the region R. On transforming the contour integral into a surface integral extended over the enclosed area, we obtain

$$\begin{aligned} &\int_C \left[\frac{1}{\theta}\left(\frac{\partial E}{\partial V} + p\right) dV + \frac{1}{\theta}\frac{\partial E}{\partial t} dt\right] \\ &= \iint \frac{1}{\theta}\left[\left(\frac{\partial E}{\partial V} + p\right)\frac{1}{\theta}\frac{d\theta}{dt} - \frac{\partial p}{\partial t}\right] dV dt. \end{aligned} \tag{18}$$

If the integrand of the surface integral were positive (or negative) at all points within any subregion R_1, however small, the surface integral extended over the area enclosed by any contour within R_1 would be positive (or negative), as therefore would be the line integral taken along the contour. But this

is impossible, since the contour may be that of a Carnot cycle, for which by (17) the line integral is equal to zero. And the integrand cannot be positive (or negative) at all points of a line segment, or at isolated points, since it is continuous.

Hence the integrand of the surface integral is equal to zero at *all* points in the specified field of aeriform states; and thus the surface integral extended over any finite area is equal to zero; wherefore the line integral taken along the contour C of the area is equal to zero. If we write DQ for the heat-element (16) for the region, we find

$$\int_C \frac{DQ}{\theta(t)} = 0. \tag{19}$$

11. *The Scale of Absolute Temperatures.* The fact that the integrand of the surface integral in (18) is everywhere equal to zero affords a differential equation for the absolute temperature $\theta(t)$. This integrand contains the quantity $\partial E/\partial V$, which we can express in terms of the experimentally measureable heat capacity $\partial E/\partial t$ and the "free expansion effect" $(\partial t/\partial V)_E$,

$$\frac{\partial E}{\partial V} = -\left(\frac{\partial E}{\partial t}\right)_V \left(\frac{\partial t}{\partial V}\right)_E.$$

But the appearance of the free expansion effect is unsatisfactory, since measurements of this quantity cannot be made with much accuracy. More accurate equivalent data can be obtained by measuring the changes of temperature of a thermometric gas on expansion against reduced opposing pressures, thus formulating the "throttled expansion effect,"

$$\left(\frac{\partial t}{\partial p}\right)_{E+pV}.$$

To introduce this quantity we repeat the calculation leading to (18), taking p, t independent instead of V, t, and finding

$$\left(\frac{\partial E}{\partial p} + p\frac{\partial V}{\partial p}\right)\frac{1}{\theta}\frac{d\theta}{dt} + \frac{\partial V}{\partial t} = 0. \tag{20}$$

To formulate the throttled expansion effect, we differentiate the function $E+pV$,

$$d(E + pV) = \left(\frac{\partial E}{\partial p} + p\frac{\partial V}{\partial p} + V\right)dp + \left(\frac{\partial E}{\partial t} + p\frac{\partial V}{\partial t}\right)dt.$$

Since $dE+pdV$ is the heat-element of the gas, the term in dt is the heat absorbed per degree for constant p — it is the specific heat c_p of the gas for constant pressure. It follows that

$$\frac{\partial E}{\partial p} + p\frac{\partial V}{\partial p} = -c_p\left(\frac{\partial t}{\partial p}\right)_{E+pV} - V,$$

which converts (20) into

$$\frac{1}{\theta}\frac{d\theta}{dt} = \frac{\dfrac{\partial V}{\partial t}}{c_p\left(\dfrac{\partial t}{\partial p}\right)_{E+pV} + V}. \tag{21}$$

This equation can be integrated when the forms of V and c_p and the throttled expansion effect shall have been determined by experiment. For the temperature of an arbitrary scale we select the temperature T of the centigrade scale of the standard hydrogen thermometer. It is a fact of observation that, for any relatively low constant pressure p, the volume V of a body of hydrogen is closely proportional to the quantity $T+273$,

$$V = \phi(p)\cdot(T + 273).$$

If we employ this approximation, and neglect the throttled expansion effect, which is small, integration of (21) yields

$$\theta = c(T + 273).$$

Let T_r and T_s be the ice point and the boiling point. Then

$$\theta(T_s) - \theta(T_r) = c(T_s - T_r);$$

that is, $100 = c.100$, or $c = 1$. Hence, very approximately,

$$\theta = T + 273.$$

12. *The Entropy Law.* It is now desired to show that the quantity of heat absorbed by any body B, on any reversible path in any given region R_i of the realizable states of equilibrium of B, is equal to the corresponding line integral of a linear differential expression in the independent variables $x_{i1}, x_{i2}, \cdots, x_{in}$ that determine the states of R_i. We assume that the body is in equilibrium under an imposed uniform temperature and under a finite number of imposed forces; that the work absorbed by the body on any reversible path of change of its state can be considered to be developed by a mechanism M connected with the body; and that this work is equal to the corresponding line integral of a linear expression,

$$DW_i = p_{i1}dx_{i1} + p_{i2}dx_{i2} + \cdots + p_{in}dx_{in},$$

in which the p_{ij} are continuous functions of the x_{ij}, and which in general is inexact. It then follows, by the energy law $DQ_i = dE_i - DW_i$, that the heat-element DQ_i for the region is a similar linear expression

$$DQ_i = q_{i1}dx_{i1} + q_{i2}dx_{i2} + \cdots + q_{in}dx_{in}.$$

Let *any* body B undergo *any* possible reversible cyclic change of thermodynamic state, isothermal or not, the process being so conducted that all

work transferred to or from B is exchanged with a mechanism M, and all heat transferred is exchanged with a body G of hydrogen gas in thermal equilibrium with B; while all work transferred to or from G is exchanged with M. At the conclusion of the cycle the body B has regained its initial state and energy, while G has regained its initial temperature, and either has or has not regained its initial volume and hence its initial energy.

Suppose G has not regained its initial volume. On returning G to its initial state by reversible isothermal expansion or compression, the gas exchanges work with M and absorbs heat q from an outside body H, where q is either positive, negative, or zero. If q is positive, the change of state of M is a net absorption of work q, compensated by the isothermal development of heat by H.[3] This violates the second law. If q is negative, the change of state of M is a net development of work q, which compensates the isothermal absorption of heat by H. A reversal of the whole set of operations would cause M to absorb work q at the expense of an isothermal development of heat by H, thus again violating the second law. So $q=0$.

In general the described cyclic path of the reversible change of state of B traverses successive regions $R_a, R_b, \cdots, R_a$ of states of B. At every instant of the process the temperatures of B and G are equal, and the heat-element DQ_i absorbed by B is equal to the negative of the heat-element DQ_g absorbed by G. By integration along the entire path, therefore, we have that

$$\int \frac{DQ_a}{\theta} + \int \frac{DQ_b}{\theta} + \cdots + \int \frac{DQ_a}{\theta} = -\int_C \frac{DQ_g}{\theta},$$

where each term of the sum of line integrals is taken along the path-segment lying in the corresponding region. But, by (19), the second member of this equation is equal to zero. For G either regains its initial state when B does, or it can be restored to this state along an isothermal path on which it absorbs heat $q=0$. So we find

$$\int \frac{DQ_a}{\theta} + \int \frac{DQ_b}{\theta} + \cdots + \int \frac{DQ_a}{\theta} = 0.$$

Here θ is a function of t, which is a function of the regional variables and may in particular be one of these variables or be a constant. Selecting a state of reference, in a region R_0, specified by the set ρ of the values of the regional variables there, we define the function S_i at the general state σ of the general region R_i by integration along any reversible path of the change of state $\rho\sigma$,

$$S_i = \int_\rho \frac{DQ_0}{\theta} + \cdots + \int^\sigma \frac{DQ_i}{\theta}. \tag{22}$$

For the quantity so defined is independent of the reversible path between ρ

[3] For the energy of the body composed of B, G, and M is increased by q; wherefore the energy of M is increased by q, since the energies of B and G have their initial values.

and σ. The quantity S_i is termed the *entropy* of the body for the region R_i. On crossing the boundary separating a region R_i from a region R_j, the entropy S_i is succeeded by the entropy S_j, which in general is a function of a different set of independent variables and has a different analytical form. By (22), the heat-element DQ_i is expressed in terms of the two functions θ and S_i,

$$DQ_i = \theta dS_i.$$

Reversible adiabatic transfers of work, since they occur at constant entropy, are termed *isentropic*. Irreversible adiabatic changes of state are not isentropic.

It appears that the function $1/\theta(t)$ is an integrating factor of the heat-element DQ_i for any non-isothermal region of states of equilibrium. Now, the ratio of any two integrating factors contains all the independent variables. When t is one of the regional variables, θ^{-1} is a function of this variable, and it follows that any other integrating factor contains the other variables and may contain all the variables. Hence the absolute temperature $\theta(t)$ is determined by the circumstance that it is the only integrating divisor of DQ_i that is a function of the temperature alone.

13. *The Dissipation Law.* The *reversible* processes considered in the foregoing, being continuous sets of states of equilibrium, are not realizable changes of state. Actually occurring changes of thermodynamic state proceed on *irreversible* paths. And they proceed in definite *directions*. Thus a released stone falls to the ground; a mechanism expending work against friction effects a heating; the temperatures of contiguous bodies approach a common value; a body of gas expands abruptly into a vacuum, or is compressed by the fall of a heavy piston; sugar diffuses from an aqueous solution into a supernatant layer of water; a zinc rod dissolves in aqueous acid.

If these processes are conducted under control, they develop work against the controlling forces. The falling stone raises a weight; the mechanism compresses a spring; an air engine operates through absorbing heat from the hot body and transmitting heat to the cold one; the expanding gas develops work against a confining piston; the falling piston raises a weight; the sugar develops work against a semipermeable piston separating the solution from the water; the dissolving zinc develops an electric current that drives a motor.

To judge from these examples, it would seem that any actual thermodynamic process can be utilized for the production of work. When it is conducted under complete control it is conducted reversibly, and it develops the maximum work possible. The irreversible process then develops the least work possible, it follows the path of least resistance.

The validity of this idea may be tested by studying a diversity of irreversible processes. An extensive class of changes of state that admit reversible paths includes the destruction of work by impact or friction, and it includes heat conduction, expansion or compression of elastic bodies, diffusion, and some chemical reactions. When any change of state of this class is conducted under control it develops work against the controlling forces, wherefore the energy

lost as work must be restored as heat when the change of state is completed on a reversible path. Since this addition of heat increases the entropy of the set of bodies undergoing the process, it follows that the irreversible change proceeds in the direction permitting the greatest possible increase of the entropy of the set. This is merely a way of saying that the irreversible process follows the path of least resistance, or of the greatest possible avoidance of doing work. It is a way of saying that work which the process could be compelled to develop is dissipated in producing a heating effect. When a cooling is produced, it is less than that which occurs when the change of state is conducted reversibly.

The inductively reached conclusion, that actual thermodynamic processes are dissipative, will here be termed the *dissipation law*:

In any actual change of state of a dynamically and thermally isolated body, the change of the entropy of the body is positive.

When an irreversible process is not known to admit a reversible path, the conclusion stated cannot be drawn. For the process cannot be shown to be dissipative if work cannot be gained by conducting it under control; and nothing is known of the change of entropy, since this is defined only with reference to a reversible path. That such processes are dissipative is generally believed; but it is not clear that conclusive grounds for this belief can be given.

The term "second law of thermodynamics" is often employed to mean the dissipation law.

QUESTIONS, DISCUSSIONS AND NOTES

EDITED BY R. E. GILMAN, Brown University, Providence, Rhode Island

The department of Questions and Discussions in the Monthly is open to all forms of activity in collegiate mathematics, including the teaching of mathematics, except for specific problems, especially new problems, which are reserved for the department of Problems and Solutions.

AN ALIGNMENT CHART FOR VARIOUS MEANS

By DAVID MOSKOVITZ, Carnegie Institute of Technology

Our purpose is to discuss a type of nomographic chart which seems to be peculiarly adapted for the determination of various means of two numbers. We desire a chart of the form described below.

Let $w=f(u, v)$ be a positive function of the two positive variables u and v, which are assumed to have the same range; and let $f(u, v)$ possess the property that

$$f(u, v) = v \cdot f(y, 1), \text{ where } y = u/v,$$

so that $f(u, v)$ is a homogeneous function of the first degree. We impose the further condition on $f(u, v)$ that

$$f(a, a) = a.$$

We desire to obtain the equation of a curve $x = \pm F(y)$, symmetric about the

y-axis such that when the points P and Q (one of which is to the left and the other to the right of the y-axis), whose ordinates are u and v are joined by a straight line, this line shall meet the y-axis at the point whose distance from the origin is given by $w=f(u, v)$.

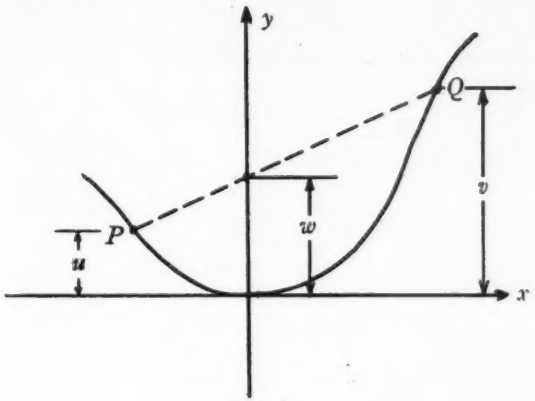


FIG. 1

Let the coordinates of P and Q be $(-x', y')$ and (x'', y''), respectively, where x', x'', y', y'' are positive. The equation of the line joining P and Q is

$$(y - y')(x'' + x') = (y'' - y')(x + x')$$

and the intercept of this line on the y-axis is given by

$$Y = (x''y' + x'y'')/(x'' + x')$$

Now let, $y'=u$, $y''=v$, $x'/x''=x$, and hence $y'/y''=u/v=y$; then

$$Y = y'' \cdot \frac{(y'/y'') + (x'/x'')}{1 + (x'/x'')} = v \cdot \frac{y + x}{1 + x}.$$

But we desire Y to be equal to $w=f(u, v)=v \cdot f(y, 1)$; hence

$$v \cdot \frac{y + x}{1 + x} = v \cdot f(y, 1),$$

from which on solving for x, we find

$$x = \frac{f(y, 1) - y}{1 - f(y, 1)},$$

and this is the equation of the desired curve for our nomographic chart. Here y is a variable which ranges from 0 to 1. By assigning values to y ranging from 0 to 1 and computing the corresponding values of x, we obtain points which are to the right of the y-axis. The curve is symmetrical about the y-axis and hence points to the left of the y-axis can be located.

The choices of scales on the x and y-axis are independent of each other; any scale may be used on either axis. The chart so constructed can be used for any range of values of u and v, since the ordinate $y=1$ may be made to correspond to the largest permissible value of u or v. If the chart is to be used for a function in which the largest value of u or v is to be A, then the ordinate $y=t$ will correspond to $v=tA$. We illustrate with the following applications to various means. We have in each case taken the range of values of u and v to be 0 to 10.

(1) Arithmetic mean:

$$w = f(u, v) = (u + v)/2.$$

The required curve is given by

$$x = \frac{(y+1)/2 - y}{1 - (y+1)/2} = \frac{(1-y)/2}{(1-y)/2} = 1.$$

(2) Geometric mean:

$$w = f(u, v) = \sqrt{uv}.$$

The required curve is given by

$$x = \frac{\sqrt{y} - y}{1 - \sqrt{y}} = \sqrt{y}.$$

(3) Harmonic mean:

$$w = f(u, v) = 2uv/(u + v).$$

The required curve is given by

$$x = \frac{2y/(y+1) - y}{1 - 2y/(y+1)} = \frac{y - y^2}{1 - y} = y.$$

(4) Heronian mean:

$$w = f(u, v) = (u + \sqrt{uv} + v)/3.$$

The required curve is given by

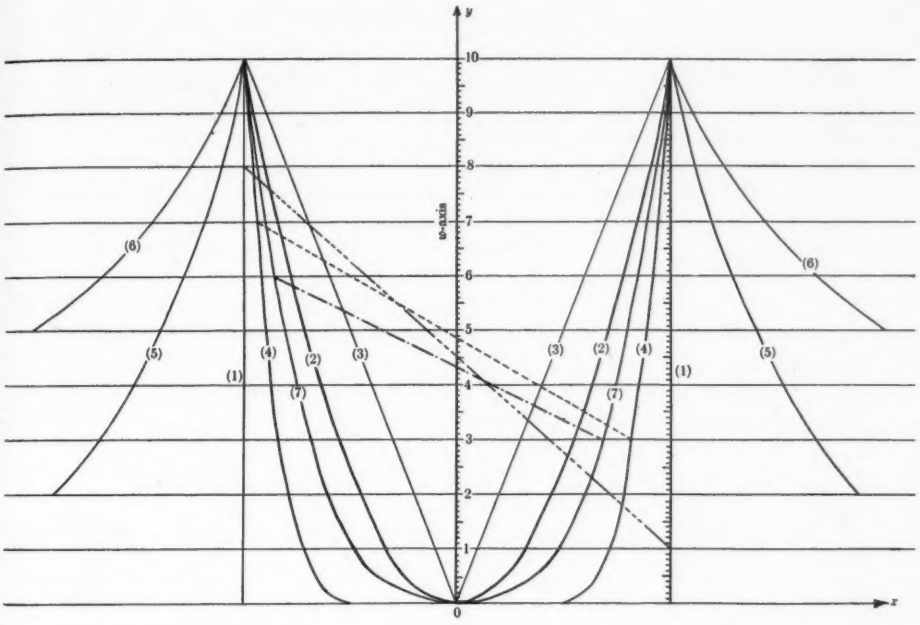
$$x = \frac{(y + \sqrt{y} + 1)/3 - y}{1 - (y + \sqrt{y} + 1)/3} = \frac{\sqrt{y} + 1 - 2y}{2 - y - \sqrt{y}} = \frac{1 + 2\sqrt{y}}{2 + \sqrt{y}}.$$

(5) Root mean-square:

$$w = f(u, v) = \sqrt{(u^2 + v^2)/2}.$$

The required curve is given by

$$x = \frac{\sqrt{(y^2+1)/2} - y}{1 - \sqrt{(y^2+1)/2}}.$$



(6) Contraharmonic mean:

$$w = f(u, v) = (u^2 + v^2)/(u + v).$$

The required curve is given by

$$x = \frac{(y^2+1)/(y+1) - y}{1 - (y^2+1)/(y+1)} = \frac{1-y}{y-y^2} = 1/y.$$

(7) Logarithmic mean:

$$w = f(u, v) = \frac{u - v}{\ln u - \ln v}. \qquad [\ln u = \log_e u]$$

The required curve is given by

$$x = \frac{(y-1)/(\ln y) - y}{1 - (y-1)/(\ln y)} = \frac{y - 1 - y \ln y}{\ln y - y + 1}.$$

It is to be noted that in the equations of the curves of (5) and (7), the value of x is indeterminate when $y = 1$; but in each of these $x \to 1$ as $y \to 1$.

The accompanying diagram combines the above seven cases. To use the chart, we will illustrate by finding the Heronian mean of the numbers 3 and 7. The curve (4) is the one to be used for the Heronian mean of two numbers.

Join the point on the right hand branch of curve (4) whose ordinate is 3 to the point on the left hand branch of curve (4) whose ordinate is 7. The dotted line joining these points crosses the y-axis at the point for which $w=4.86$.

As has been mentioned earlier, although the accompanying chart shows the range of values of u and v to be 10, yet the same chart can be used for any other range. For example, to find the logarithmic mean of 9 and 18, we multiply the existing scale by 3 so that the chart now has a range of 30. The dotted and dashed index line on the chart between the right and left branches of curve (7) gives the required reading, crossing the y-axis at the point for which $w=3(4.33)$ $=12.99$.

A familiar fact which can be easily seen from this chart is that for given values of u and v, for which $u\neq v$, of the seven cases of means considered, the harmonic mean is the smallest mean, while the largest mean of u and v is the contraharmonic mean. The order of magnitude of the various means is the order in which the curves lie between the curve for the harmonic mean and the curve for the contraharmonic mean. We can thus see that

harmonic < geometric < logarithmic < Heronian < arithmetic < root mean-square < contraharmonic.

The third index line on the chart gives the arithmetic mean of 1 and 8 to be 4.5.

An Unusual Spiral

By L. S. Johnston, University of Detroit

We discuss in this note a spiral differing from the more familiar spirals in that its whorls all have a common point, and that all its whorls have a common tangent at this common point. The writer encountered the spiral while investigating a problem submitted to him by a member of the designing staff of a company manufacturing reflectors.[1] This problem may be stated as follows:

Using the conventional polar coordinate net, let $(a, \pi/2)$ be the coordinates of a given point P_0. Let the perpendicular to OP_0 at P_0 intersect the line $\theta=\pi/4$ at P_1, the perpendicular to OP_1 at P_1 intersect the line $\theta=\pi/8$ at P_2, etc., thus establishing the sequence $[P_n]$ of points $P_0, P_1, P_2, \cdots$. We wish to find

(a) the limit point P_∞ of $[P_n]$,

(b) a continuous function $\rho=f(\theta)$ which includes $[P_n]$ and P_∞, and

(c) an elementary geometric construction by which other points on $\rho=f(\theta)$ may be located.

We discuss these parts in order.

(a) Let $OP_i=\rho_i$ $(i=0, 1, 2, \cdots)$ and $\theta_i=$ angle P_iOX,

OX being the line $\theta=0$. We then have

[1] See "Cochleoid", Encyclopaedia Britannica (14th edition), vol. 6, p. 894. Also solution of problem E41, this issue of the Monthly, p. 609.

$$\rho_0 = a, \quad \rho_1 = a \sec \frac{\pi}{4}, \quad \rho_2 = a \sec \frac{\pi}{4} \sec \frac{\pi}{8}, \cdots$$

(1)

$$\rho_n = a \sec \frac{\pi}{4} \sec \frac{\pi}{8} \sec \frac{\pi}{16} \cdots \sec \frac{\pi}{2^{n+1}}, \text{ and}$$

(2) $$\theta_0 = \frac{\pi}{2}, \quad \theta_1 = \frac{\pi}{4}, \quad \theta_2 = \frac{\pi}{8}, \cdots, \theta_n = \frac{\pi}{2^{n+1}}.$$

From the identity $\sec \theta = 2 \sin \theta / \sin 2\theta$ we have

$$\rho_n = 2^n a \sin \frac{\pi}{2^{n+1}} = \frac{\pi a}{2} \left(\frac{\sin \dfrac{\pi}{2^{n+1}}}{\dfrac{\pi}{2^{n+1}}} \right).$$

Hence

$$\rho_\infty = \operatorname*{Lim}_{n \to \infty} \rho_n = \frac{\pi a}{2}.$$

Also, since

$$\operatorname*{Lim}_{n \to \infty} \theta_n = 0,$$

we have $(\pi a/2, 0)$ as the coordinates of the point P_∞.

It may be remarked here that this furnishes an excellent and convenient method of finding the approximate circumference of a circle of given material radius, for OP_4 differs from the true length of the quadrant by less than one six hundredth part of the quadrant.

(b) We note that

$$\rho_n = \frac{\pi a}{2} \frac{\sin \theta_n}{\theta_n}$$

when n is finite,
and that

$$\operatorname*{Lim}_{n \to \infty} \rho_n = \frac{\pi a}{2}.$$

Hence the function

$$\rho = \frac{\pi a}{2} \frac{\sin \theta}{\theta} \qquad (\theta \neq 0)$$

$$\rho = \frac{\pi a}{2} \qquad (\theta = 0)$$

is completely defined and continuous at every point, and is a function of the kind required.

(c) In the function derived above let $\theta = p\pi$, p being any number, integral or fractional, such that $p\pi$ can be constructed by elementary geometry. Then $\rho = (a \sin p\pi)/2p$. Since $\sin p\pi$ can be constructed by elementary geometry, we may find by elementary geometry the value of ρ for any admissible value of p.

It is evident that as θ increases through positive values the point (ρ, θ) traces a spiral in the first and second quadrants, passing through the origin for every value $\theta = n\pi$, n being integral. Furthermore it is easily shown that the horizontal axis is tangent to the curve at the origin. The curve is symmetric with respect to horizontal axis; hence there are two sets of whorls tangent to each other at the origin.

Some interesting properties of this spiral may be mentioned.

(1) the chord joining (ρ_1, α_1) and (ρ_2, α_2), where $\alpha_2 = 2\alpha_1$, is perpendicular to the line $\theta = \alpha_2$. Hence if we locate any point (ρ, α) on the curve, we may establish a sequence of points on the curve in a manner exactly like that by which $[P_n]$ was established. Every such sequence has $(\pi a/2, 0)$ as the limit point.

(2) The tangent to the curve at any point (ρ, α) intersects the line $\theta = 2\alpha$ on the circle $\rho = \pi a/2$. Hence if any line $\theta = \alpha$ be drawn through the origin, all the tangents to the curve at the points of intersection of this line and the curve pass through the same point, $(\pi a/2, 2\alpha)$.

(3) Let any line $\theta = \alpha$ intersect the successive whorls of the spiral, reading inward from the outermost intersection, at $R_0, R_1, R_2, \cdots$. Then $OR_0, OR_1, OR_2, \cdots$, form a harmonic sequence. This property is, of course, the same as that of the reciprocal spiral.

RECENT PUBLICATIONS

EDITED BY R. A. JOHNSON, Brooklyn College of the City of New York

All books for review should be sent directly to the editor of this department, at Brooklyn College, 66 Court Street, Brooklyn, N. Y., and not to any of the other editors or officers of the Association.

REVIEWS

Introductory Mathematics by J. W. Lasley and E. T. Browne. New York, McGraw-Hill Book Co., 1933. xv+439 pages. $2.75.

This book possesses many features that should commend it to those who believe in courses in generalized mathematics. It is, as it purports to be, a thorough introduction to algebra, trigonometry, and the calculus, and not merely a "survey" of these fields.

Perhaps the most striking feature is the admirably clear exposition of the theory. The treatment of Chapter IV on the "rate of change of functions"—leading up to the notion of the derivative—is especially commendable. Students will like the book because of the completeness of the discussion where theoretical difficulties are involved.

Part I—five chapters, 190 pages—deals with simple algebraic functions from the viewpoint of algebra, analytic geometry and differential and integral calculus. The algebra covers rather thoroughly much of the field usually included in College Algebra, including determinants of the second and third orders and the solution of numerical equations. In analytics only single-valued integral functions are considered so that no mention is made, for example, of the ellipse and the hyperbola. The calculus and its applications are thoroughly covered,

with all discussion based on algebraic functions solely, an excellent feature in a brief first course.

Part II—three chapters, 150 pages— is concerned with exponential, logarithmic and trigonometric functions, their derivatives and their applications. The solution of triangles is covered with sufficient detail.

The book is well printed and bound. There are plenty of exercises and such notions as momentum, work, etc. are carefully explained. The historical notes should also prove interesting.

EDWARD FLEISHER

The Theory of Spherical and Ellipsoidal Harmonics. By E. W. Hobson. Cambridge, University Press, 1931. xi+500 pages.

Partial Differential Equations of Mathematical Physics. By H. Bateman. Cambridge, University Press; New York, The Macmillan Co., 1932. xxii+522 pp.

These are both works of the "encyclopedic" type, falling in the general class of which we have had previously outstanding examples in Hobson's *Theory of Functions of a Real Variable* and Watson's *Bessel Functions*. Books of this type are extremely useful as reference works, both to those who are pursuing research in the given field or related fields, and to those who already have some acquaintance with the theory and wish to widen their knowledge in that direction. Neither is to be recommended primarily as an introduction to the field with which it deals.

It is inevitable that in a book of this encyclopedic type the exposition should suffer somewhat. In the first place, it is not humanly possible to cover so much ground, including researches that are still in process of development and thus lacking in completeness, and at the same time achieve that essential unity of treatment which stamps a mathematical treatise as a genuine work of art. Furthermore, it is rather natural that the tremendous labor of compiling a work dealing with such a mass of literature should leave the author in a less critical frame of mind with regard to details of exposition. Both works exhibit some of the defects here indicated, but these detract only in a minor way from their primary utility as specified above.

Both books deal with mathematical theories whose origin is to be found in problems of mathematical physics, and particularly in boundary value problems in connection with partial differential equations of physical significance. The work of the late Professor Hobson, as its title indicates, restricts itself to a comprehensive discussion of spherical and ellipsoidal harmonics, and the prevailing point of view in the exposition is that of the pure mathematician. Professor Bateman's book deals in part with the same material, necessarily more briefly, but treats also many other mathematical theories arising in connection with boundary value problems. Moreover, the form of exposition is oriented more toward the point of view of the mathematical physicist. For these reasons Hobson's book exhibits greater unity and would present less difficulty to a reader studying the field for the first time.

Among the important topics dealt with in Bateman's book, beyond those also treated by Hobson, may be mentioned the following: Fourier series, Green's theorem, Stokes's theorem, Green's function for various domains, Poisson's integral, conformal mapping, and Bessel functions. These topics, and others, are treated both in such of their theoretical aspects as lie closest to the physical applications, and also in connection with numerous particular applications. For a complete list of topics the reader is referred to the table of contents, which covers six pages in small type.

In conclusion let us reemphasize the point that the two authors have produced books which will be of great service to a large group of mathematicians and mathematical physicists, and that they have necessarily done this at the cost of much time and labor to themselves. They have earned the gratitude of the group in question and they deserve much credit for their achievement.

C. N. MOORE

Plane Trigonometry. By J. A. Northcott. New York, Ray Long and Richard R. Smith, Inc., 1933. x+152 pages. $1.60. Bound with Five-place Tables of E. S. Crawley, $2.40. Tables alone (F. S. Crofts Company), $1.00.

Plane Trigonometry. By W. L. Hart. New York, D. C. Heath and Company, 1933. vi+186+16 pages. $1.68. Bound with Three-, Four-, and Five-place Tables, $2.00. Tables alone, $1.32.

Plane Trigonometry. By C. A. Ewing. New York, McGraw-Hill Book Company, Inc., 1933. xii+165 pages. $1.20. Bound with Five-place Tables of R. D. Beetle, $1.60. Tables alone, $0.80.

These three texts lend themselves to joint review, for they present sufficient variety in attitude to afford interesting comparisons. Northcott "believes that analysis is the central theme" and that "computation should play only a subsidiary rôle." He even goes so far as to suggest that the computational theme might find ample room for development in a single concluding chapter. Hart "gives full recognition to both the numerical and the analytical sides of the subject," but is so bent on providing a flexible text that the two main themes are all but obscured. Ewing, anxious to meet the requirements of the College Entrance Examination Board, is well aware of the importance of both computation and analysis; but, for him, this means division of the composition into two distinct sections: Part One on the Solution of Triangles and Part Two on Trigonometric Analysis. Since Northcott and Ewing put computation and analysis in separate compartments, it is Hart who offers perhaps the best basis for an elastic presentation which aims at effective interplay of themes.

In Northcott, "a conscious effort has been made to keep the treatment brief." We find spots, however, where the discussion seems concise to the point of inadequacy. We mention the directions for computing with approximate data (page 17), and the explanation of limiting values of the functions (page 39). And it is difficult to understand the absence of the $\pm$ sign in the half-angle for-

mulas (page 64). We gain the impression that brevity has been secured through omission of explanatory material rather than through judicious compression. Yet we recognize the author's feeling for exposition and realize the unity he obtains by stressing the analytic aspect.

Hart starts with the acute angle but assures the reader that it is equally feasible to begin with the general angle. We are presented, throughout, with four- or five-place tables, and with choice of odd- or even-numbered problems. And the instructor, in graphing the functions, may measure angles in radians and take the unit the same on both axes (as does Northcott), or he may use degree measure and (with Ewing) make arbitrary selection of scale on the x-axis. There is never obtruded the question of right or wrong; since the intention is to please the teacher, a preference is no sooner implied than it is followed by an alternative procedure. In short, flexibility is carried to extremes; and the result is a heterogeneous presentation which of necessity lacks backbone. But a host of teachers will welcome the wealth of detailed material and be won by the freedom it affords.

Ewing's scheme—of opening with the acute angle and sticking to computation until it is disposed of—is carefully worked out and will appeal to those who favor this approach. Others, who like to plunge at once into the general angle, will turn to Hart, or to Northcott, according as they wish, or do not wish, to alternate theory with computation. Ewing deals satisfactorily with identities. But Hart is misleading in his rating of methods of proof, and Northcott considers solely the problem of transforming one expression into another, as if this were the only useful notion to be retained in identities. Also, Ewing differs from the others in that he concludes, not with a list of answers, but with a collection of recent examinations set by the College Board.

On certain points, it is especially interesting to make comparison of the three texts. Take, for example, the question of check formulas to be used in the logarithmic solution of oblique triangles. Ewing and Northcott advisedly employ the Mollweide equations, but without mention of other possible check formulas. Hart, after sounding appropriate warnings against the use of the Law of Sines as a check in Case I, makes no comment when he uses this law to check Case III. We should like to see the available check formulas more fully discussed both as to efficacy and inefficacy.

Another topic where comparisons are illuminating is that of computation. We have already expressed regret at the little Northcott gives us on computation with approximate values. Hart has more to say in this connection, but he does not prepare the ground for even a formally adequate treatment of the subject. It is little comfort to the student to be told (page 47) that "the degree of accuracy of the data and the nature of a problem must be carefully considered in deciding what places are *significant* in the results." And only a dearth of precise methods can explain the author's counsel (page 48) to round off "to a number of significant places which appears reasonably justified by the data."

Ewing contributes the maximum of detail on the subject of computaton. We

find explanations of abbreviated multiplication and division, of logarithms, of the slide rule, and some mention of computing machines. But, again, the rules are insufficient for the needs of practice. There is evidence that the vital point has been missed. Witness the attitude (page 4) toward absolute error and relative error. Moreover, as the treatment proceeds, we note less and less emphasis on rigor in computation. On page 98, conversion factors are given to the same number of decimal places, as if they were to enter additively. And we sense the same difficulty that we met in Hart when, at the very close of Part I in Ewing, we read: "the student should use his judgment as to the degree of accuracy of his results."

With such meager explanations as are found in the three texts under review, it seems clear that in questions of accuracy of computed results the student is left to his own feeble resources. So far as analysis is concerned, our authors meet the immediate requirements of the student; but, in the matter of computation, these texts resemble the majority of their predecessors in that they virtually ask the student to mark time. Yet, if training in computation is to serve any end, practical or theoretical, there can be no room for conjecture; instruction in this topic must provide intelligible and workable rules for obtaining the desired results from the given data.

As trigonometries go, these are all good texts. But it would hardly be honest appraisal to dismiss them with the observation that each has well-graded problems, neat figures—and an index. It should be pointed out that these are texts of the conventional type, and, therefore, teachable only in the sense that the teacher must supply the spark. And the matter becomes one of grave concern in that the formal instruction we deprecate continues often through Analytics and the Calculus. Thus is defeated the first object, which, as the reviewer sees it, is to develop in the student power: power to discern, to discriminate, and to dig deeply. We move toward this goal, not by furnishing the student a collection of rules and formulas, but rather by encouraging him to ask why and by helping him acquire the ability to answer his queries for himself.

C. A. GARABEDIAN

Mathematical Excursions. By Helen A. Merrill. Norwood, Mass., The Norwood Press, 1933. xi+143 pages.

This well named book is a very diverting volume, and most successful in carrying out its plan to be easily understood by those who are not learned. The variety of topics gives scope for manifold interests, and the very evident joy with which the author collected her illustrative material from near and far, and wrote the book, is conveyed to the reader throughout. To know how to do "multiplying without multiplication tables," to understand "how circulating decimals circulate," and to be able to write magic squares, for instance, will fascinate the young reader, as well as give pleasure to those already initiated.

A large part of the book is developed from number theory, and follows the lines of analysis. About a quarter of it, however, has material using algebra and

geometry in combination. It is especially interesting on "geometrical arithmetic" and on linkages. Under the chapter on different ways of writing numbers, many operations apparently difficult are divested of their camouflage and shown as simple applications of operations with dyadic numbers. The same direct simplicity characterizes the chapter on multiplying, one of whose attractions is its exhibition of the Russian Peasants' Method of multiplication. The chapter on incommensurable numbers, and that on π offer aid to the beginner who is often puzzled by those members of the number family. In the final chapter the statements of some of the famous unsolvable problems are given. Throughout the book many problems are solved, and one finds ample explanatory material. At the same time the author states, for the reader, a large collection of problems to be solved. For some of these the answers are listed at the end of the book.

The material, treatment, and the arrangement of this book make it a very suitable one for undergraduate mathematical clubs, as well as for pleasurable individual "excursions."

M. E. WELLS

Die Dreiteilung des Winkels. By Walter Breidenbach. Mathematisch-Physikalische Bibliothek, Reihe I, Band 78. Leipzig and Berlin, Teubner, 1933. iv+38 pages. RM 1.20.

The quadrature of the circle and the duplication of the cube have been considered by Beutel and by Herrmann in numbers 12 and 68 of this series. In this brochure the author brings out very clearly the degree of difficulty in the trisection of the angle. The proof of the impossibility of a construction by ruler and compasses is intentionally incomplete, the theorem that an algebraic expression is constructible if and only if it contains at most rational numbers and square roots being assumed.

The chief interest in the book lies in the large variety of solutions by higher plane curves, and especially in the reduction of these solutions to a unifying principle and to a single figure. The linkage trisectors of Kempe and of Sylvester are not included in the section on trisection instruments.

B. H. BROWN

MATHEMATICS CLUBS

EDITED BY F. M. WEIDA, The George Washington University, Washington, D.C.

All reports of club activities, suggestions and topics for club programs should be sent to F. M. Weida, The George Washington University, Washington, D.C. All manuscript should be typewritten with double spacing, and with margins at least one inch wide.

CLUB ACTIVITIES
1932–1933

THE PI MU EPSILON MATHEMATICAL FRATERNITY

Pi Mu Epsilon is an academic fraternity in institutions of university grade. Its primary aim

is the advancement of mathematics and scholarship. It is a living, active, working fraternity of scholars in which the members are actively engaged in study and research and the exchange of ideas in the field of mathematical science.

Pi Mu Epsilon of the University of Kentucky

The officers for the year 1932–1933 were: Dr L. W. Cohen, Director; Dr. H. H. Downing, Vice Director; Professor M. C. Brown, Secretary; Dr. C. G. Latimer, Librarian; Miss Buena Mathis, Treasurer for the first semester and Professor D. E. South, Treasurer for the second semester. These officers were elected May 19, 1932.

The meetings and programs were as follows:

October 13, 1932: "Topology" by Dr. L. W. Cohen.

November 10, 1932: "Correlation surfaces" by Professor D. E. South.

December 8, 1932: "Mathematical logic" by Dr. John Kuiper, Department of Philosophy.

December 9, 1932: Initiation banquet. Five new members were initiated.

January 12, 1933: "Equation balances" and "Mathematical epitaphs" by Professor E. L. Rees.

February 9, 1933: "Algebraic numbers and ideals" by Dr. C. G. Latimer.

March 9, 1933: "Newton's problem in the calculus of variations" by Dr. H. H. Downing.

April 5, 1933: "Mathematical models" by Dr. W. L. Moore of the University of Louisville.

April 15, 1933: Initiation banquet. Five new members were initiated.

May 5, 1933: "Genera of binary quadratic forms" by D. B. Palmeter; "Methods of calculation of tables of binary quadratic forms" by J. H. D. Teller.

The chapter donated $100 in books to the library and voted to donate a second hundred dollars worth of books in the near future.

M. C. BROWN, *Secretary*

Pi Mu Epsilon of Iowa State College

The officers for 1932–1933 were: Marianne Pruess, Director; Guy Strong, Vice Director; Glenn Walrath, Treasurer; Ruth Frizzell, Secretary; George Fink, Librarian; Professor D. L. Holl, Faculty Advisor; Dr. E. R. Smith, Head of the Department of Mathematics, Permanent Secretary.

We now have seventy-five active members. We had one initiation the past year on February 1, 1933, at which time we initiated eight new members.

At the annual college Honor's Day in the fall, 1932, we awarded a check of $15 and a certificate to Harold F. Graves, a junior electrical engineering student. We give this prize each year to the student having the highest scholastic average who has completed the course in calculus. This student is also taken into Pi Mu Epsilon.

The meetings and programs were as follows:

October 19, 1932: "German schools" by Dr. E. S. Allen.

December 7, 1932: Review of a paper by B. F. Kimball on "Three theorems applicable to vibration theorems" by R. H. Cook.

January 10, 1933: "Showing that lead will float and cork will sink" by Walter Fraser; Review of a book entitled "Mathematical Wrinkles" by Charles Armstrong.

February 1, 1933: Initiation and banquet.

February 15, 1933: Illustrated lecture on "What the Egyptians knew about mathematics 3500 years ago" by Marian E. Daniells.

March 8, 1933: "Solution of a diffraction equation" by Guy Strong; "Early history of mathematics in America" by Marianne Pruess.

April 19, 1933: "The use of the Wronskian in solving differential equations for linear independence" by C. C. Hurd; "Origin of the calendar" by Ruth Frizzell.

May 16, 1933: "An Iowa journal of mathematics" by Gertrude Herr; Review of the book "Numerology" by E. T. Bell given by Dr. C. Gouwens.

RUTH FRIZZELL, *Secretary*

LOCAL MATHEMATICS CLUBS

The Mathematics Club of the Cooper Union Institute of Technology

The officers for 1932–1933 were: W. W. Rigrod, '33, President; L. Green, '34, Vice President; J. F. Skelly, '34, Secretary; C. A. Wamser, '34, Assistant Secretary; J. B. Watkins, '33, Treasurer; H. J. Queen, '33, Librarian; M. Greenspan, '33, Publication Representative.

The Club has a membership of two hundred fifty.

The meetings and programs were as follows:

November 9, 1932: "The nature of complex numbers" by Professor W. B. Fite of Columbia University.

December 7, 1932: "Theory and use of the slide rule" by H. J. DiGiovanni, '33.

December 14, 1932: "Practical applications of trigonometry to surveying" by J. B. Lyttle, '34.

January 11, 1933: "Theory of least squares" by F. Shapiro, '35.

February 1, 1933: "Mathematical fallacies" by T. W. Reynolds, '35.

February 8, 1933: "Calculating machines" by A. F. Barry, '35.

March 1, 1933: "Transcendental numbers" by H. Turkin, '35.

March 15, 1933: "Determination of position in navigation" by B. K. Hartman, '35.

April 12, 1933: "Geometry of the complex domain" by M. Greenbaum, '34. Election of officers for 1933–1934.

C. H. LEHMANN, *Faculty Advisor*

The Junior Mathematics Club of the University of Chicago

The officers for 1932–1933 were: Miss Julia W. Bauer, President; Mr. Clyde H. Graves, Secretary-Treasurer; Mr. Joseph D. Novak, Program Chairman; Miss Frances E. Baker, Social Chairman.

The purpose of the Junior Mathematics Club is to give the undergraduates as well as the graduates the opportunity of hearing papers in different branches of mathematics which members of the group have prepared and wish to present to the club. Consequently, not only do Fellows in mathematics, National Research Council Fellows, and graduate students working on special problems present papers to the club, but also undergraduates who are specializing in mathematics and who have been encouraged to address the club. Occasionally a professor from a related field has been asked to talk upon a subject of interest which will show the application of mathematics. Therefore, we may say our aim is to broaden the student's knowledge of mathematics and to supplement class room instruction by giving students an opportunity to present and to listen to papers on various phases of mathematics.

The club sponsors practically all of the social activities of the department of mathematics. Its membership for the past year has been about 52. Any graduate student or undergraduate majoring in mathematics or mathematical astronomy is eligible to membership. The meetings which are preceded by teas are held on every other Wednesday in Eckhart Hall Common Room.

The meetings and programs were as follows:

October 12, 1932: Address of welcome by Professor G. A. Bliss; Short talk on the library facilities by Professor L. M. Graves; Report of the Association meetings held in California in August by Professor M. I. Logsdon.

October 25, 1932: "The historical background of certain mathematical periods" by Dr. R. G. Sanger.

November 9, 1932: "Some necessary conditions underlying the early development of mathematics" by Professor H. E. Slaught.

November 23, 1932: "The knot problem" by Miss Anna A. Stafford.

December 7, 1932: "A problem closely related to the shortest distance problem in the calculus of variations" by Dr. M. R. Hestenes.

January 4, 1933: "Transformations of ruled surfaces" by Mr. Joseph D. Novak.

January 18, 1933: "Evolution of the concept 'Integer'" by Mr. H. S. Clair.

February 1, 1933: "Symmetry and design from the group standpoint" by Miss Frances Baker.

February 15, 1933: "Determination of sets of integral elements for certain rational division algebras" by Mr. G. C. Webber.

March 1, 1933: "The Egyptian's use of mathematics" by Dr. J. A. Wilson of the Oriental Institute of the University of Chicago.

March 15, 1933: "Correlations and null-systems" by Mr. Clyde H. Graves.

April 12, 1933: "The isoperimetric properties of the sphere" by Dr. Max Coral.

April 26, 1933: "Some applications of mathematics to the study of personality" by Professor L. L. Thurstone of the Psychology Department.

May 10, 1933: "A brief history of the infinitesimal calculus" by Mr. H. H. Harmon.

May 24, 1933: "Nomograms" by Dr. William C. Krumbein of the Geology Department.

June 7, 1933: "Women in mathematics" by Dr. Ruth G. Mason.

During the year a tea dance and five bridge parties were sponsored by the club.

CLYDE H. GRAVES, *Secretary-Treasurer*

PROBLEMS AND SOLUTIONS

EDITED BY B. F. FINKEL, OTTO DUNKEL, H. L. OLSON, AND W. F. CHENEY, JR.

ELEMENTARY PROBLEMS

Send all communications about Elementary Problems and Solutions to Wm. Fitch Cheney, Jr. Dept. Box 35, Storrs, Connecticut.

The Department of Elementary Problems welcomes problems believed to be new, and demanding no tools beyond those ordinarily furnished in the first two years of college mathematics. Problems may be submitted unaccompanied by their solutions.

PROBLEMS FOR SOLUTION

E 65. *Proposed by J. M. West, Pennsylvania State College.*

If the vertices of a triangle taken counterclockwise have the abscissas x_1, x_2 and x_3, and if the slopes of the opposite sides are m_1, m_2 and m_3, then prove that the area equals $\frac{1}{2}(x_1-x_2)(x_1-x_3)(m_2-m_3)$, as well as either of the two similar expressions obtainable from this by cyclic permutation of the subscripts.

E 66. *Proposed by J. Rosenbaum, The Milford School, Milford, Connecticut.*

Prove that the sum of the squares of the medians of a tetrahedron equals four-ninths of the sum of the squares of the edges. (A median of a tetrahedron is a line joining a vertex with the centroid of the opposite face.)

E 67. *Proposed by E. C. Kennedy, University of Texas.*

Give a scheme for writing down mechanically the sides of an unlimited number of dissimilar right triangles whose sides are integers. After the first set, the values are to be written down, not merely indicated, without any calculations whatever. No addition, subtraction, multiplication, division, involution or evolution, mental or otherwise, is allowed.

One way is to start with the triangle whose sides are 21, 220 and 221.

E 68. *Proposed by W. F. Cheney, Jr., Connecticut State College.*

In the triangle ABC, D is the midpoint of BC. The equilateral triangles,

ABP, ACQ and ADR are drawn in the plane of triangle ABC, the vertices of each being listed counterclockwise. Prove that R is the midpoint of PQ.

E 69. *Proposed by Raphael Robinson, University of California at Berkeley.*

Instead of a product of powers, a^bc^d, a printer accidentally prints the four digit number, $abcd$. The value is however the same. Find the number and show that it is unique.

Editor's Note. This problem may be found in Dudeney's *Amusements in Mathematics* (Thomas Nelson and Sons), page 20.

SOLUTIONS

E 36. [1933, 295] *Proposed by B. H. Brown, Dartmouth College.*

Show that the thirteenth of the month is more likely to be Friday than any one of the other days of the week.

Solution by Raphael Robinson, University of California at Berkeley.

Leap years are determined in a way which depends on the number of the year modulo 400. But in 400 years, including 97 leap years, there are exactly 20,871 weeks. Hence the calender repeats every 400 years. (If there were not an exact integral number of weeks in 400 years, there would be an equal chance for the thirteenth of the month to fall on each day of the week.) In 400 years the thirteenth of the month occurs just 4800 times, distributed among the different days of the week as follows:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
687	685	685	687	684	688	684

Hence, in the long run, the thirteenth of the month is most likely to fall on Friday.

Solved also by Churchill Eisenhart and the proposer.

E 37. [1933, 295] *Proposed by Arthur Haas, Thomas Jefferson High School, N.Y.*

In the following multiplication of a three-place number by a two-place number, all but three of the sixteen digits have been replaced by the letter x. Reconstruct the problem and show that the solution is unique.

$$\begin{array}{rrrrr} & & x & x & x \\ & & & x & x \\ \hline & & x & x & x \\ & x & x & 4 & \\ \hline x & x & x & 0 & 1 \end{array}$$

Solution by Grace Shover, Columbus, Ohio.

The values of some of the x's are apparent by inspection, so we insert their values and reletter the others thus:

$$\begin{array}{cccccc} & & a & b & c & \\ & & & d & e & \\ \hline & & f & 6 & 1 & \\ & 9 & g & 4 & & \\ \hline 1 & 0 & h & 0 & 1 & \end{array}$$

Since the product of c and e ends in 1, they can only be 1 and 1, or 3 and 7, or 7 and 3, or 9 and 9, which gives us the following four cases for consideration.

Case 1. $c=e=1$. $(abc)(e)=f61$. $b=6$. $a=f$. $(f61)(d)=9g4$. $d=4$. $g=4$. And no value of f will fit.

Case 2. $c=3$. $e=7$. $7(abc)=f61$. $b=2$. $a=1$. $abc=123$. $d(123)=9g4$. $d=8$. $g=8$. $h=7$. No contradictions arise and $123\times87=10701$ is a solution.

Case 3. $c=7$. $e=3$. $3(ab7)=f61$. $b=8$. $d(a87)=9g4$. $d=2$. $a=4$. But then $3\times487=f61$ and no one-digit value of f will fit.

Case 4. $c=9$. $e=9$. $9(ab9)=f61$. $b=2$. $9(a29)=f61$. $f=9a+2<10$, which is impossible, since a is not zero.

Since only one solution appeared in trying all possible cases, it is unique.

Solved also by Mrs. Annabel S. Boyce, W. E. Buker, M. L. Constable, S. A. Corey, A. P. Free, F. C. Gentry, E. C. Kennedy, H. R. Leifer, Theodore Lindquist, Lee Lorch, Roy MacKay, Janet McDonald, C. T. Oergel, Raphael Robinson, R. M. Sutton, Simon Vatriquant and B. C. Zimmerman.

E 38. [1933, 295] *Proposed by J. R. Musselman, Western Reserve University.*

It is well known that the midpoints of the sides of any plane quadrilateral constitute the vertices of a parallelogram. Determine the most general conditions under which the parallelogram becomes (a) a rhombus, (b) a rectangle, and (c) a square.

Solution by Lazarus Medveson, Jr., Albuquerque, New Mexico.

From the theorem which states that the line joining the midpoints of two sides of a triangle is parallel to and equal to half of the third side, there follow these general conditions:

(a) If the diagonals of the quadrilateral are equal, the parallelogram is a rhombus.

(b) If the diagonals of the quadrilateral are perpendicular, the parallelogram is a rectangle.

(c) If the diagonals of the quadrilateral are both equal and perpendicular, the parallelogram is a square.

Solved also by F. C. Gentry, Theodore Lindquist, Lee Lorch, Roy MacKay, O. J. Ramler and Simon Vatriquant.

E 39. [1933, 295] *Proposed by W. R. Ransom, Tufts College.*

Obtain both roots of the equation, $x^2-365.04x+45.04=0$, correct to four significant digits, by means of four-place logarithm tables.

Solution by Maud Willey, Long Beach, Mississippi.

The customary solution by the quadratic formula gives $x=182.52\pm\sqrt{33269}$, but four-place logarithms give $\sqrt{33269}=182.4$, and hence give but one significant digit of the smaller root. However, the larger root is 364.9 and the product of the roots is the given number, 45.04. A simple logarithmic division then gives the smaller root as .1234.

R. N. Walter arrives at the same results by the method due to C. H. Gräffe, which is explained on page 121 of L. E. Dickson's *Elementary Theory of Equations.*

Solved also by the proposer.

E 41. [1933, 296] *Proposed by V. F. Ivanoff, San Francisco.*

A variable circular arc of constant length, l, has one end fixed in position and direction. Find the locus of its other end.

Solution by O. J. Ramler, Catholic University, Washington, D. C.

Employing a system of polar coordinates, we take the center of the variable arc on a line perpendicular to the polar axis at the origin. Let the fixed end of the variable arc be at the origin, and let the polar axis be tangent to the arc at this point. Let the free end of the arc have the polar coordinates, (r, θ).

Then if R is the variable radius of the variable arc of constant length l, the central angle in radians is l/R, and $\theta=l/2R$. Also, $r=2R\sin\theta$. When R is eliminated between these two equations, there results the equation of the locus,[1]

$$r\theta = l\sin\theta.$$

The curve is a double spiral, symmetric about the polar axis, with an unlimited number of loops all tangent to the polar axis at the origin.

From the nature of the problem it is quite obvious that when $\theta=0$, $r=l$, thus illustrating nicely an important limit of the calculus, namely:

$$\operatorname{Lim}_{\theta\to 0}\frac{\sin\theta}{\theta}=1.$$

Solved also by Lazarus Medveson, Jr., C. C. Richtmeyer; Simon Vatriquant, and R. N. Walter.

Advanced Problems

Send all communications about Advanced Problems and Solutions to B. F. Finkel, Springfield, Mo. All manuscript should be typewritten, with double spacing, and with margins at least one inch wide.

[1] See *An Unusual Spiral* by L. S. Johnston, this issue of the Monthly, p. 596.

Problems containing results believed to be new, or extensions of old results are especially sought. The editorial work would be greatly facilitated if, on sending in problems, proposers would also enclose any solutions or information that will assist the editors in checking the statements. In general, problems in well-known textbooks or results found in readily accessible sources, will not be proposed as problems for solution in this department. In so far as possible, however, the editors will be glad to assist members of the Association in the solution of such problems.

PROBLEMS FOR SOLUTION

3646. *Proposed by N. A. Court, University of Oklahoma.*

Determine the surface generated by the common perpendicular of two skew lines a and b, when a describes a flat pencil while b remains fixed.

3647. *Proposed by H. Grossman, New York.*

Prove that

$$\sum_{n=0}^{\infty} \frac{(-4\pi^2r^2)^n}{(2n+1)!} = \sum_{n=0}^{\infty} \frac{(-4\pi^2r^2)^n}{(2n+2)!} = 0,$$

where r is any integer.

3648. *Proposed by W. H. Rasche, Virginia Polytechnic Institute.*

Derive by the method of instantaneous centers a construction for the tangent at any point of the Archimedean spiral.

3649. *Proposed by F. T. H'Doubler, Springfield, Mo.*

Solve the functional equation

$$f(xy) = [f(x)]^{y^\beta}[f(y)]^{x^\beta},$$

where β is a real constant and $f(x)$ is a real continuous and single valued function of the real variable x.

3650. *Proposed by W. H. Rasche, Virginia Polytechnic Institute.*

Given in a plane any five points which are known to lie upon an ellipse; construct by ruler and compasses the principal axes of the ellipse. Show how the construction may fail if the points are chosen arbitrarily.

3651. *Proposed by Orrin Frink, Jr., Pennsylvania State College.*

Two persons play a game using 24 cards numbered 1 to 6, placed face up, (there being four cards of each number), by alternately turning over any card not previously turned. The first player to make the sum of the numbers on the cards turned over exceed 30, loses. With best play, should the player who plays first always win, or always lose?

3652. *Proposed by A. F. Stevenson, University of Toronto.*

The practice of certain cigarette manufacturers of supplying playing cards, poker hands, etc. with their cigarette packets, and of offering various articles in exchange for a complete set of these cards, suggests the following problem:

Assuming that each packet of cigarettes contains one of a set of 52 cards, and that these cards are distributed among the packets at random, (the num-

ber of packets available being infinite) what is the average minimum number of packets that must be purchased in order to obtain a complete set of cards?

3653. *Proposed by L. S. Johnston, University of Detroit.*

Given the triangle ABC and the points A', B', and C' on BC, CA, and AB respectively such that $AC'/C'B=BA'/A'C=CB'/B'A=m/n$ (m less than n for convenience). Let AA' and BB' intersect at C'', BB' and CC' intersect at A'', and CC' and AA' intersect at B''. Prove that

$$AB'':B''C'':C''A'=BC'':C''A'':A''B'=CA'':A''B'':B''C',$$

and calculate the division ratios in terms of m and n.

SOLUTIONS

3585. [1932, 608]. *Proposed by R. E. Gaines, University of Richmond.*

If a tangent at P_1 to the cardioid $\rho=a(1+\cos\theta)$ cuts the curve again at P_2 and P_3, and if the normal at P_1 cuts the curve again at P_4, P_5, P_6, then (1) $\rho_2\rho_3/\rho_1$ is constant. Also (2) $\rho_1+\rho_2+\rho_3=\rho_4+\rho_5+\rho_6$; (3) if the chord $P_2P_3=2^{1/2}a$, it subtends a right angle at the origin.

Solution by F. Underwood, University College, Nottingham, England.

Let the point P_1 be $\{a(1+\cos\alpha),\alpha\}$. Then the tangent and normal at P_1 are respectively,

$$\frac{2a}{\rho}\cos^3\frac{\alpha}{2}=\cos\left(\theta-\frac{3\alpha}{2}\right)$$

and

$$\frac{2a}{\rho}\cos^2\frac{\alpha}{2}\sin\frac{\alpha}{2}=\sin\left(\frac{3\alpha}{2}-\theta\right).$$

The values of ρ for the points where these meet the cardioid again are given by putting

$$\cos\theta=\rho/a-1\ ;\ \sin\theta=\{\rho(2a-\rho)\}^{1/2}/a.$$

Hence ρ_1, ρ_1, ρ_2, ρ_3 are the roots of the equation

$$\rho^4-2a\rho^3-3a^2\rho^2\cos\frac{3\alpha}{2}\cos\frac{\alpha}{2}+4a^3\rho\cos\frac{3\alpha}{2}\cos^3\frac{\alpha}{2}+4a^4\cos^6\frac{\alpha}{2}=0,$$

and ρ_1, ρ_4, ρ_5, ρ_6 are the roots of

$$\rho^4-2a\rho^3-a^2\rho^2\sin\frac{3\alpha}{2}\sin\frac{\alpha}{2}$$

$$+4a^3\rho\sin\frac{3\alpha}{2}\cos^2\frac{\alpha}{2}\sin\frac{\alpha}{2}+4a^4\cos^4\frac{\alpha}{2}\sin^2\frac{\alpha}{2}=0.$$

Hence

$$\rho_2\rho_3/\rho_1 = \frac{\rho_1^2\rho_2\rho_3}{\rho_1^3} = \frac{4a^4\cos^6\frac{\alpha}{2}}{a^3(1+\cos\alpha)^3} = \frac{a}{2}. \tag{1}$$

Also $2\rho_1+\rho_2+\rho_3=2a=\rho_1+\rho_4+\rho_5+\rho_6$; and therefore

$$\rho_1+\rho_2+\rho_3=\rho_4+\rho_5+\rho_6. \tag{2}$$

Since

$$\rho_2+\rho_3=2(a-\rho_1), \qquad 2\rho_2\rho_3=a\rho_1, \tag{3}$$

we must have $0\leqq\rho_1\leqq\frac{1}{2}a$ in order for ρ_2 and ρ_3 to be real. If $\rho_1=\frac{1}{2}a$, $\alpha=2\pi/3$; and $\rho_2=\rho_3=\frac{1}{2}a$, $\theta_2=\theta_3=4\pi/3$. We then compute

$$\cos\theta_3\cos\theta_2=\frac{5\rho_1}{2a}-1, \qquad \sin\theta_3\sin\theta_2=+\frac{3\rho_1}{2a},$$

where in the second equation above the minus sign has been rejected in taking a square root; for we see from this equation that neither factor on the left can be zero except for $\rho_1=0$. When $\rho_1=\frac{1}{2}a$ the sign is seen to be plus and it will remain plus for ρ_1 in the interval $0\leqq\rho_1\leqq\frac{1}{2}a$.

Set $\phi=\theta_3-\theta_2\geqq 0$, then

$$4\rho_1=a(1+\cos\phi), \qquad 0\leqq\rho_1\leqq\tfrac{1}{2}a,\ \pi\geqq\phi\geqq 0. \tag{4}$$

From the law of cosines and (3) and (4) we find

$$P_2P_3=2a\sin\tfrac{1}{2}\phi. \tag{5}$$

Hence if $P_2P_3=2^{1/2}a$, $\phi=\frac{1}{2}\pi$, $\rho_1=\frac{1}{4}a$, and $\cos\alpha=-\frac{3}{4}$. The proof shows also that the converse is true.

3587. [1933, 52] *Proposed by P. R. Rider, Washington University.*

The axes of two right circular cylinders of indefinite length intersect perpendicularly. Find the volume common to the two cylinders. (This problem actually arose in designing a tank car.)

Solution by N. B. Moore, California Institute of Technology.

If the two cylinders are of equal radius R, then every section of the common volume parallel to, and at a distance x from the plane of the axes, is a square of area $4(R^2-x^2)$, and the common volume is

$$V_{R,R}=8\int_0^R(R^2-x^2)dx=(16/3)R^3.$$

If the cylinders have radii r, $R(0\leqq r\leqq R)$, then every such section is a rectangle of area $4(R^2-x^2)^{1/2}(r^2-x^2)^{1/2}$, and

$$V_{r,R} = 8\int_0^r (R^2 - x^2)^{1/2}(r^2 - x^2)^{1/2}dx.$$

By making the transformation $x = r \sin \theta$, and denoting by k the ratio r/R, it is easily shown that

$$V_{r,R} = 8k^2R^3I(k),$$

where

$$I(k) \equiv \int_0^{\pi/2} \frac{d\theta}{\Delta\theta} - (1 + k^2)\int_0^{\pi/2} \frac{\sin^2\theta\, d\theta}{\Delta\theta} + k^2\int_0^{\pi/2} \frac{\sin^4\theta\, d\theta}{\Delta\theta},$$

$$\Delta\theta = (1 - k^2 \sin^2\theta)^{1/2}.$$

$I(k)$ can be evaluated by using the following well-known relations, where the notation is that commonly used for complete elliptic integrals of first and second kinds:

$$\int_0^{\pi/2} \frac{\sin^4\theta\, d\theta}{\Delta\theta} = \frac{2(1 + k^2)}{3k^2}\int_0^{\pi/2} \frac{\sin^2\theta\, d\theta}{\Delta\theta} - \frac{1}{3k^2}\int_0^{\pi/2} \frac{d\theta}{\Delta\theta},$$

$$\int_0^{\pi/2} \frac{\sin^2\theta\, d\theta}{\Delta\theta} = (1/k^2)\int_0^{\pi/2} \frac{d\theta}{\Delta\theta} - (1/k^2)\int_0^{\pi/2} \Delta\theta\, d\theta,$$

$$\int_0^{\pi/2} \frac{d\theta}{\Delta\theta} = K, \text{ and } \int_0^{\pi/2} \Delta\theta\, d\theta = E.$$

The common volume is thus readily obtained as

$$V_{r,R} = (8/3)R^3[(1 + k^2)E - (1 - k^2)K],$$

or,

$$V_{r,R} = \tfrac{1}{2}V_{R,R}[(1 + k^2)E - (1 - k^2)K].$$

Solved also by C. A. Hutchinson, W. W. Johnson, J. B. Meyer, V. F. Murray, C. E. Rhodes, C. Grace Shover, and the proposer. J. E. Thompson referred to a solution in Hancock's *Elliptic Integrals*, p. 89, ex. 6. A similar problem is given in Byerly's *Integral Calculus*, sec. ed., p. 281.

3588. [1933, 52] *Proposed by N. H. McCoy, Smith College.*

Find an explicit expression for f_n if $f_0 = 1$ and

$$f_{n+1} = (x^2 + y^2)f_n + 2ty\frac{\partial f_n}{\partial x} + t^2\frac{\partial^2 f_n}{\partial x^2},$$

where t is a parameter. Show that

$$(f_n)_{x=y=0} = K_n t^n, \quad K_n = \left.\frac{d^n(\sec 2t)^{1/2}}{dt^n}\right|_{t=0}.$$

Solution by J. V. Uspensky, Stanford University.

The power series

$$\omega = \sum_0^\infty \frac{\tau^n}{n!} f_n,$$

provided it has a non-vanishing convergence radius, by virtue of the conditions

$$f_{n+1} = (x^2 + y^2)f_n + 2ty\frac{df_n}{dx} + t^2\frac{d^2f_n}{dx^2}, \quad f_0 = 1,$$

represents that solution of the equation

$$\frac{\partial\omega}{\partial\tau} = (x^2 + y^2)\omega + 2ty\frac{\partial\omega}{\partial x} + t^2\frac{\partial^2\omega}{\partial x^2},$$

which for $\tau = 0$ reduces to 1. One easily verifies that such a solution is given by

$$\omega = \{\sec(2t\tau)\}^{1/2} \exp\left[\frac{x^2 + y^2}{2t}\tan(2t\tau) + \frac{xy}{t}\{\sec(2t\tau) - 1\}\right].$$

Expanding it into a power series in τ we can find the explicit expression of f_n as a homogeneous function of $p = x^2 + y^2$, $q = xy$ and t of the dimension n. The fact that

$$(f_n)_{x=y=0} = K_n t^n$$

where

$$K_n = \frac{d^n(\sec 2\tau)^{1/2}}{d\tau^n}\bigg|_{\tau=0}$$

follows immediately from the expression for ω.

Solved also by L. Zander.

3591. [1933, 52] *Proposed by B. F. Kimball, Schenectady, N. Y.*

Let the nth difference of $\log x$ with difference interval one, be denoted by $\Delta^n \log x$. Show that

$$\lim_{n\to\infty} n^z \log n\Delta^n \log x = \Gamma(x).$$

Solution by Morgan Ward, California Institute of Technology.

Denote by (R) that portion of the plane of the complex variable z bounded by a cut along the negative axis of reals and a fixed circle of arbitrarily large radius, and let the argument of z be greater than $-\pi$ and less than π. Then $\log z$ and $\Gamma(z)$ are one-valued analytic functions of z throughout (R). I shall show that if x is any fixed point within (R),

$$(1) \qquad (-1)^{n+1} n^z \log n\Delta^n \log x = \Gamma(x) + O\left(\frac{1}{\log n}\right),$$

the constant implied in the O-symbol necessarily depending on x. The sign $(-1)^{n+1}$ was omitted by the proposer.

First of all, if $n \geqq 1$,

$$(2) \qquad (-1)^{n+1}\Delta^n \log x = \int_0^1 \frac{(n-1)!\,dt}{(x+t)(x+t+1)\cdots(x+t+n-1)}.$$

For

$$\Delta^n \log x = \Delta^{n-1}[\log(x+1) - \log x] = \Delta^{n-1}\int_0^1 \frac{dt}{x+t} = \int_0^1 \Delta^{n-1}(x+t)^{-1}dt,$$

and by the familiar formula of the calculus of finite differences for the difference of a factorial,

$$\Delta^{n-1}(x+t)^{-1} = \frac{(-1)^{n+1}(n-1)!}{(x+t)(x+t+1)\cdots(x+t+n-1)}.$$

Now it is well known that if z is fixed,

$$\lim_{n\to\infty} \frac{n^z 1\cdot 2\cdots(n-1)}{z(z+1)\cdots(z+n-1)} = \Gamma(z).$$

If we rewrite the expression on the left as $n^z\Gamma(n)\Gamma(z)/\Gamma(z+n)$ and use the asymptotic formulas for $\Gamma(n)$, $\Gamma(z+n)$ which are valid if z is in (R), we obtain the more precise result

$$\frac{(n-1)!}{z(z+1)\cdots(z+n-1)} = \frac{\Gamma(z)}{n^z} + O\left(\frac{1}{n^{z+1}}\right), \quad |\arg z| < \pi.$$

Now assume that x is in (R). Then we may write $x+t$ for z in this expression and substitute in the integral in (2). There results

$$\begin{aligned}(-1)^{n+1}\Delta^n \log x &= \int_0^1 \left(\frac{\Gamma(t+x)}{n^{t+z}} + O\left(\frac{1}{n^{t+x+1}}\right)\right)dt \\ &= \frac{1}{n^x}\int_0^1 \frac{\Gamma(t+x)}{n^t}\,dt + O\left(\frac{1}{n^{x+1}\log n}\right).\end{aligned}$$

On integrating by parts, we find that

$$\begin{aligned}(3) \qquad (-1)^{n+1}\Delta^n \log x &= \frac{\Gamma(x)}{n^x \log n} - \frac{\Gamma(x+1)}{n^{x+1}\log n} \\ &\quad + \frac{1}{n^x \log n}\int_0^1 \frac{\Gamma'(t+x)}{n^t}\,dt + O\left(\frac{1}{n^{x+1}\log n}\right).\end{aligned}$$

It is clear that

$$\int_0^1 \frac{\Gamma'(t+x)}{n^t}\,dt = O\left(\frac{1}{\log n}\right).$$

Therefore, if we multiply (3) by $n^x \log n$, we obtain finally

$$(-1)^{n+1} n^x \log n \Delta^n \log x = \Gamma(x) + O\left(\frac{1}{n}\right) + O\left(\frac{1}{\log n}\right) + O\left(\frac{1}{n}\right)$$

$$= \Gamma(x) + O\left(\frac{1}{\log n}\right).$$

I should like to express my thanks to Professor Otto Dunkel for suggesting a simplification of my initial solution.

Solved also by the proposer.

NEWS AND NOTICES

Readers are invited to contribute to the general interest of this department by sending items to Professor J. H. Weaver, Ohio State University, Columbus, Ohio.

The Fourth International Conference of Applied Mechanics will be held at Cambridge, England, July 3 to 9, 1934. All persons interested in the subject are invited to attend and submit papers. Information relative to types of papers that may be presented can be obtained from the Secretary, Fourth International Conference of Applied Mechanics, Engineering Laboratory, Cambridge.

Professor V. Karapetoff of the Department of Electrical Engineering of Cornell University has been appointed Lieutenant Commander in the Naval Reserve and has been assigned to the Volunteer Naval Reserve for engineering duties.

The Rumford Medal of the American Academy of Arts and Sciences has been awarded to Professor Harlow Shapley of Harvard University for researches in the luminosity of stars and galaxies.

Dr. Charles F. Roos, formerly permanent secretary of the American Association for the Advancement of Science, has been granted indefinite furlough from the fellowship of the Guggenheim foundation, to enable him to accept an appointment as specialist in economic balance for the National Recovery Administration. He assumed office July 27.

The University of Wisconsin has conferred an honorary doctorate on Professor Arnold Sommerfeld of the University of Munich.

An account of the life and works of the late professor J. C. Fields of the University of Toronto has been prepared by Professor J. L. Synge of the same university, and published in the April, 1933, issue of the Journal of the London Mathematical Society.

Assistant Professor H. W. Brinkmann of Harvard University has been appointed to an associate professorship at Swarthmore College.

Dr. Dirk Brouwer has been promoted to an associate professorship of astronomy at Yale University.

Mrs. Grace Murray Hopper has been appointed instructor at Vassar College.

INDEX TO VOLUME XL, 1933

THE AMERICAN MATHEMATICAL MONTHLY

By R. G. SANGER, The University of Chicago

PAPERS, REPORTS OF MEETINGS

ARCHIBALD, R. C. Arnold Buffum Chace, 139–142.

BABCOCK, H. A. On the valuation of land awaiting conversion to a higher use, 147–153.

BARBOUR, J. M. A sixteenth century Chinese approximation for π, 69–73.

BLISS, G. A. Mathematical interpretations of geometrical and physical phenomena, 472–480.

BRAND, L. Non-analytic functions of a complex variable, 260–265.

BROWNE, E. T. On the classification of collineations in the plane, 333–340.

BRUCE, G. H. See Daniels, F.

BUCHANAN, H. E. Small oscillations of the neutral helium atom near the straight line positions, 532–537.

BUNCH, W. H. Pascal's hexagram with certain elements in motion, 251–260.

CAMP, C. C. A new method for finding the numerical sum of an infinite series, 537–542.

CLARK, C. E. Bi-affine geometry in the plane, 73–76.

COURT, N. A. On two intersecting spheres, 265–269.

COX, W. E. JR. Lagrange's quintic for the neutral helium atom. 406–409.

DANIELS, F., BRUCE, G. H., STONE, C. H., SCHRENCK, W. T., and YOE, J. H. The mathematical training of chemists, 1–4.

FRANKLIN, P. The geometric interpretation of some formulas of analytic geometry, 143–147.

GANGULI, S. The Indian origin of the modern place-value arithmetical notation. Part III, 25–31.

——— The Indian origin of the modern place-value arithmetical notation. Part IV, 154–157.

GARRETT, J. A. See Wren, F. L.

GARVER, R. A reading list in the elementary theory of equations, 77–84.

GRANT, J. D. A graphical solution of the quartic, 31–32.

GROSSMANN, H. D. Power sums of roots, 219–221.

HILL, L. S. Probability functions and statistical parameters, 505–532.

HUNTINGTON, E. V. Air resistance to falling spheres, 451–455.

KEMPNER, A. J. Geometry as an avocation, 455–471.

LANE, E. P. Projective differential geometry, 568–579.

LEHMER, D. H. A photo-electric number sieve, 401–406.

LIBBY, W. F. A convergence test and a remainder theorem, 216–218.

Mathematical Association of America. Election to membership, 133–134, 315, 449–450. Seventeenth annual meeting, W. D. CAIRNS, 125–139. Seventeenth summer meeting, W. D. CAIRNS, 441–451.

Mathematical Association of America, Sections of. Indiana, May meeting, P. D. EDWARDS, 394–398. Iowa, April meeting, J. F. REILLY, 389–392. Kansas, February meeting, LUCY T. DOUGHERTY, 315–318. Maryland-District of Columbia-Virginia, December 1932 meeting, F. M. WEIDA, 189–190; May 1933 meeting, F. M. WEIDA, 398–401. Michigan, March meeting, W. L. AYRES, 320–322. Nebraska, April meeting, A. L. HILL, 392–394. Ohio, April meeting, R. CRANE, 382–386. Philadelphia, November 1932 meeting, P. A. CARIS, 63–64. Rocky Mountain, April meeting, A. J. LEWIS, 386–389. Southern California, March meeting, P. H. DAUS, 318–320. Texas, February meeting, N. EDMONSON, 379–382. Wisconsin, Organization meeting, H. P. PETTIT, 64–65; April meeting, H. P. PETTIT, 567–568.

MILLER, G. A. Historical note on negative numbers, 4–5.

MILNE, W. E. On the numerical integration of certain differential equations of the second order, 322–327.

MITCHELL, A. K. The Cayley-Hamilton theorem, 153–154.

PALL, G. On sums of squares, 10–18.

RICHESON, A. W. The number system of the Mayas, 542–546.

SCHRENCK, W. T. See Daniels, F.

SHOHAT, J. A. A correction, 340.

SLAUGHT, H. E. Eliakim Hastings Moore, 191–195.

STONE, C. H. See Daniels, F.

SYNGE, J. L. Thermostatic control, 202–216.

TREVOR, J. E. Thermodynamics—an exposition, 580–592.

UHLER, H. S. Negative-reciprocal equations, 327–333.

USPENSKY, J. V. A minimum problem, 5–10.

WEAVER, J. H. Curves determined by a one-

parameter family of triangles, 85–91.
WEGNER, U. The product of a circulant matrix and a special diagonal matrix, 23–25.
WESTERFIELD, E. C. A new bound for the zeros of polynomials, 18–23.
WILLIAMSON, J. The expansion of determinants of composite order, 65–69.
WREN, F. L., and GARRETT, J. A. The development of the fundamental concepts of infinitesimal analysis, 269–281.
YOE, J. H. See Daniels, F.
YOUNG, MABEL M. Curves arising from a single infinity of triangles, 196–202.

QUESTIONS AND DISCUSSIONS—DISCUSSIONS

BELL, E. T. A suggestion regarding foreign languages in mathematics, 287.
BENTON, T. C. Homogeneous linear differential equations of the second order, 346–349.
BRAUER, A. Question concerning the maximum term in the diatomic series—proposed by A. A. Bennett, 409–410.
BULLARD, J. A. On the evaluation of certain trigonometric integrals, 161–163.
COOLIDGE, J. L. A geometric paradox—proposed by C. H. Rowe, 91–92.
COREY, S. A. A method of solving numerical equations, 163–164.
FELD, J. M. On polygons and circles, 36–39.
FISCHER, C. H. A problem in geometrical probability, 282–285.
HILDEBRANDT, T. H. A simple continuous function with a finite derivative at no point, 547–548.
HUTCHINSON, C. A. Line representation of the hyperbolic functions, 413–414.
——— An operational formula, 482–483.
JOHNSTON, L. S. An unusual spiral, 596–598.
KENNEDY, E. C. A note on the roots of a cubic, 411–412.
LEHMER, D. H. A note on trigonometric algebraic numbers, 165–166.
LINFIELD, B. Z. A geometric paradox—proposed by C. H. Rowe, 91–97.
MERRILL, A. S. The cubic $x^2+y^2+z^2-2xyz=1$, 224–226.
MOSKOVITZ, D. An alignment chart for various means, 592–596.
MUSSELMAN, J. R. On certain types of polygons, 157–160.
——— A rectangular hyperbola theorem, 480–481.
MYERS, R. J. An upper limit for the roots of an equation, 35–36.
RANDELS, W. A remark on Fourier series of continuous functions, 97–99.
RAYNOR, G. E. Numbers equal to the sum of the digits of their Nth powers, 285–286.
SALKOVER, M. Remarks on the mathematics of finance, 167–169.
SHOHAT, J. A. On a certain transformation of infinite series, 226–229.
SLADE, J. J. JR. Note on the Laplacian of a vector point function, 483–484.
THURSTON, H. S. Jacobians of the seminvariants S_i of a binary P-ic, 33–35.
UNDERWOOD, R. S. Recursion relations in certain expansion coefficients, 222–224.
WARD, M. A certain class of trigonometric integrals, 340–346.

RECENT PUBLICATIONS—NEW BOOKS RECEIVED

39–40, 229–230, 415.

RECENT PUBLICATIONS—REVIEWS

Adams, C. R. See Bell, E. T.
Alter, D. *Introduction to Practical Astronomy.* M. F. JORDAN, 418–419.
Ayres, W. L. See Reidemeister, K.
Barrow, D. F. See Macaulay, W. H.
Basoco, M. A. See Besicovitch, A. S.
——— See Bohr, H.
Bateman, H. *Partial Differential Equations of Mathematical Physics.* C. N. MOORE, 599–600.
Bauer, G. N. and Brooke, W. E. *Plane and Spherical Trigonometry.* A. D. CAMPBELL, 101.
Beatley, R. See Westaway, F. W.
Beenken, May M. See Glazier, Harriet E.
Bell, E. T. *Numerology.* C. R. ADAMS, 350–351.
Bennett, A. A. See Cantor, G.
——— See Davis, H. T.
Bentley, A. F. *Linguistic Analysis of Mathematics.* R. D. CARMICHAEL, 352–353.
Besicovitch, A. S. *Almost Periodic Functions.* M. A. BASOCO, 104–105.
Bjerknes, V. *C. A. Bjerknes, sein Leben und seine Arbeit.* O. ORE, 419.
Bohr, H. *Fastperiodische Funktionen,* M. A. BASOCO, 104–105.
Borofsky, S. See Neelley, J. H.
Breidenbach, W. *Die Dreiteilung des Winkels.* B. H. BROWN, 603.
Brooke, W. See Bauer, G. N.
Brown, A. B. See Moore, R. L.
Brown, B. H. See Breidenbach, W.
—— See Dörrie, H.
Browne, E. T. See Lasley, J. W.
Bruce, W. H. *The Nine Circles of the Triangle.* R. A. JOHNSON, 554.
Burington, R. S. *Handbook of Mathematical Tables and Formulas.* R. A. JOHNSON, 554.
Campbell, A. D. See Bauer, G. N.
——— See Kells, L. M.
——— See Rutherford, D. E.
Cantor, G. *Gesammelte Abhandlungen.* A. A. BENNETT, 103–104.
Carmichael, R. D. See Bentley, A. F.

——— See Ritt, J. F.
Crathorne, A. R. See Laplace, P. S.
——— See Rietz, H. L.
——— See Shewhart, W. A.
Davis, H. T. *Philosophy and Modern Science.* A. A. BENNETT, 47–48.
Dickson, L. E. *Studies in the Theory of Numbers.* A. J. KEMPNER, 40–42.
Dörrie, H. *Triumph der Mathematik. Hundert berühmte Probleme aus zwei Jahrtausenden mathematischer Kultur.* B. H. BROWN, 416–417.
Dunlap, J. W. and Kurtz, A. K. *Handbook of Statistical Nomographs, Tables and Formulas.* J. R. MUSSELMAN, 44.
Edge, W. L. *The Theory of Ruled Surfaces.* R. ROBINSON, 349–350.
Ewing, C. A. *Plane Trigonometry.* C. A. GARABEDIAN, 600–602.
Finkel, B. F. See Jones, S. I.
Fischer, P. B. *Determinanten.* L. T. MOORE, 171.
Fleisher, E. See Lasley, J. W.
Fréchet, M. and Roullet, H. *Nomographie.* J. R. MUSSELMAN, 42–43.
Garabedian, C. A. See Ewing, C. A.
——— See Hart, W. L.
——— See Northcott, J. A.
Gill, B. P. See Skinner, E. B.
Glazier, Harriet E. *Arithmetic for Teachers.* MAY M. BEENKEN, 418.
Grove, C. C. See Rietz, H. L.
Hardy, J. G. *A Short Course in Trigonometry.* C. A. NELSON, 289.
Hart, W. L. *Plane Trigonometry,* C. A. GARABEDIAN, 600–602.
Hedrick, E. R. See Klein, F.
Hobson, E. W. *The Theory of Spherical and Ellipsoidal Harmonics.* C. N. MOORE, 599–600.
Johnson, R. A. See Bruce, W. H.
——— See Burington, R. S.
Jones, S. I. *Mathematical Nuts.* B. F. FINKEL, 236–237.
Jordan, M. F. See Alter, D.
Kells, L. M. *Elementary Differential Equations.* A. D. CAMPBELL, 102–103.
Kempner, A. J. See Dickson, L. E.
Klein, F. *Elementary Mathematics from an Advanced Standpoint.* Translated by E. R. Hedrick and C. A. Noble. V. SNYDER, 170–171.
KOMMERELL, K. See Kommerell, V.
Kommerell V. and Kommerell, K. *Theorie der Raumkurven und krummen Flächen.* C. H. YEATON, 44–46.
Kurtz, A. K. See Dunlap, J. W.
Laplace, P. S. *Philosophischer Versuch über die Wahrscheinlichkeit.* A. R. CRATHORNE, 417–418.
Lasley, J. W. and Browne, E. T. *Introductory Mathematics.* E. FLEISHER, 598–599.
Lefschetz, S. *Topology.* R. L. WILDER, 232–233.
Littauer, S. B. See Rainich, G. Y.
Logsdon, Mayme I. *Elementary Mathematical Analysis.* C. A. NELSON, 486–487.
Luteyn, P. See Pettit, H. P.
Macaulay, W. H. *Solid Geometry.* D. F. BARROW, 352.
Merrill, Helen A. *Mathematical Excursions.* M. E. WELLS, 602–603.
Moore, C. N. See Bateman, H.
——— See Hobson, E. W.
Moore, L. T. See Fischer, P. B.
Moore, R. L. *Foundations of Point Set Theory.* A. B. BROWN, 100–101.
Moulton, F. R. See Popoff, K.
Murnaghan, F. D. See Phillips, H. B.
Musselman, J. R. See Dunlap, J. W.
——— See Fréchet, M.
Neelley, J. H. and Tracey, J. I. *Differential and Integral Calculus.* S. BOROFSKY, 235–236.
Nelson, C. A. See Hardy, J. G.
——— See Logsdon, Mayme I.
Noble, C. A. See Klein, F.
Northcott, J. A. *Plane Trigonometry.* C. A. GARABEDIAN, 600–602.
Nowland, F. S. *Analytic Geometry.* A. H. SPRAGUE, 355–356.
Ore, O. See Bjerknes, V.
Paradiso, L. J. See Wiarda, G.
Perron, O. *Algebra.* MINA S. REES, 484–485.
Pettit, H. P. and Luteyn, P. *College Algebra.* E. D. WELLS, 288–289.
Phillips, H. B. *Vector Analysis.* F. D. MURNAGHAN, 349.
Popoff, K. *Das Hauptproblem der Äusseren Ballistik.* F. R. MOULTON, 234–235.
Rainich, G. Y. *Mathematics of Relativity.* S. B. LITTAUER, 289–290.
Rees, Mina S. See Perron, O.
Reidemeister, K. *Knotentheorie.* W. L. AYRES, 487.
Rietz, H. L., Crathorne, A. R. and Rietz, J. C. *Mathematics of Finance.* C. C. GROVE, 46–47.
Rietz, J. C. See Rietz, H. L.
Ritt, J. F. *Differential Equations from the Algebraic Standpoint.* R. D. CARMICHAEL, 233–234.
Robinson, R. See Edge, W. L.
Roullet, H. See Fréchet, M.
Rutherford, D. E. *Modular Invariants.* A. D CAMPBELL, 105–107.
Schaaf, W. L. See Shibli, J.
Scripta Mathematica, See Yeshiva College.
Shewhart, W. A. *Economic Control of Quality of Manufactured Product.* A. R. CRATHORNE, 353–355.
Shibli, J. *Recent Developments in the Teaching of Geometry.* W. L. SCHAAF, 46.
Shook, C. A. See Slobin, H. L.
Skinner, E. B. *Introduction to Trigonometry and Analytic Geometry.* B. P. GILL, 237.
Slaught, H. E. See Yeshiva College.
Slobin, H. L. and Wilbur, W. E. *Freshman Mathematics.* C. A. SHOOK, 290–291.
Snyder, V. See Klein, F.
Sprague, A. H. See Nowlan, F. S.
Tracey, J. I. See Neelley, J. H.
Wells, E. D. See Pettit, H. P.
Wells, M. E. See Merrill, Helen A.

Westaway, F. W. *Craftsmanship in the Teaching of Elementary Mathematics.* R. BEATLEY, 548–553.
Wiarda, G. *Integralgleichungen unter besonderer Berücksichtigung der Anwendungen.* L. J. PARADISO, 169–170.
Wilbur, W. E. See Slobin, H. L.
Wilder, R. L. See Lefschetz, S.
Yeaton, C. H. See Kommerell, V.
Yeshiva College. *Scripta Mathematica.* H. E. SLAUGHT, 230–232.

MATHEMATICAL CLUBS—TOPICS

EELLS, W. C. 1933 as a centennial year in the history of mathematics, 359–360.
SELL, W. A home made mathematics exhibit, 555–556.

MATHEMATICAL CLUBS—ACTIVITIES

(Including Chapters of The Pi Mu Epsilon Mathematical Fraternity.)

Adelphi College, 490.
Alabama, University of, 420.
Brooklyn College, 420–421.
Brown University, 421.
Buffalo, University of, 421–422.
Butler University, 490.
California, University of, 488.
California at Los Angeles, University of, 488–489.
Carleton College, 489.
Case School of Applied Science, 49.
Chicago, University of, 605–606.
Cincinnati, University of, 556–557.
Colorado, University of, 239–240.
Cooper Union Institute of Technology, 605.
Detroit, Colleges of the City of, 557.
George Washington University, 358–359.
Hunter College, 489.
Iowa State College, 604.
Iowa, University of, 49.
Kappa Mu Epsilon Mathematical Fraternity, 50.
Kentucky, University of, 50, 604.
Lehigh University, 48.
Missouri, University of, 107.
Montana, University of, 108.
New Hampshire, University of, 109–110.
New Jersey College for Women, 108–109.
North Carolina College, 239.
Ohio State University, 173.
Oklahoma, University of, 356–357.
Oshkosh State Teachers College, 174.
Pennsylvania State College, 239.
Pennsylvania, University of, 238.
Pi Mu Epsilon Mathematical Fraternity. Annual meeting, 238.
Rutgers University, 240.
Syracuse University, 357–358.
Toledo, University of, 293.
Virginia, University of, 173–174.
Washington, State College of, 358.
Washington, University of, 172–173, 292–293.
Wellesley College, 293–294.
William and Mary, College of, 421.

PROBLEMS—AUTHORS

Numbers refer to pages, black-face type indicating a problem solved and solution published italics a problem solved but solution not published, ordinary type a problem proposed.

Abrahami, M., 423.
Agnew, R. P., *119*, *120*, *180*.
Allen, B. R., *120*.
Allen, E. F., *118*, **306**, *560*.
Allen, Martha, *493*.
Alliot, E., *120*, *185*.
Altshiller-Court, N., 115, 181, 243, 363, 427, 432, 435, 495, **496**, 500, 561, 610.
Anderson, A. E., **492**, *493*.
Anning, N., 422, 495.
Astrachan, M., *363*.
Aude, H. T. R., 115, *120*, 175, *370*, 371, 423, **426**, 492.
Aurelius, B., *120*.
Aylor, M. W., 558.
Ayres, F. Jr., **117**, *120*, **301**, *372*.
Baker, G. A., *372*.
Barnhart, C. A., *242*.
Beaty, Mildred, *176*.
Bennett, A. A., 180.
Bennett, T., *118*.
Berry, E. M., *58*, **58**, 120, **436**, **564**.
Bibb, S. F., *363*.
Bickerstaff, T. A., *112*, *176*, *178*.
Blake, A., 179.
Blanch, Gertrude, *249*.
Blincoe, J. W., *182*.
Botsford, J. L., *182*.
Boyce, Annabel S. *112*, *176*, *178*, *608*.
Boyce, M. G., *180*, *370*, *502*.
Bradley, A. D., *435*, *501*, *502*.
Breiland, J., *176*.
Bridger, C., *559*.
Brown, B. H., 295, 361, 607.
Buker, W. E., *112*, *120*, **176**, *178*, *242*, **362**, *363*, *370*, **425**, *426* (*2*), *493*, *494*, **494**, *559*, **559**, 563, *608*.
Bullard, J. A., 561.
Burke, W. E., *178*.
Butchart, J. H., *118*, 492, *559* (*2*), *560*.
Butler, L. G., *426*.
Butler, T., **61**, *120*.
Cairns, S. S., *120*.
Calderhead, J. A., *437*.
Campbell, H. A., 55, *370*.

Campbell, W. B., **55,** *58*, *59*, **122,** *180*, *186*, 241, *307*, *431*, *433*, *434*, *502*, 560.
Capron, P., *437*.
Carter, C. C., 243.
Carver, W. B., 558.
Charosh, M., *120*, *123*, *181*, *242* (*2*), **296,** 360, *362*, 427, *502*.
Cheney, W. F. Jr., 51 (3), 111, 113, 114, 175, 178, 242, 298, 361, 362, 426, 491, 494, 559, 606.
Church, W. R., *249*.
Clark, A. G., *180*, *431*, *434*, *563*.
Clarkson, J. A., *120*.
Collins, O. C., *120*.
Constable, M. L., *176*, *362*, *494*, *608*.
Cook, W. O., *113*.
Corey, S. A., 363, *608*.
Cramer, G. F., *120*.
Crane, R., **183,** 428, *435*, *497*.
Curtiss, D. R., **562.**
Davis, L. Jr., 299, *370*, 431.
Douglas, W., *559*.
Dresden, A., 422.
Duncan, D. C., *298*, 361, *502*, 562.
Dunkel, O., **56** (note), **58** (note), **59** (note), **123** (note), **182** (notes, 2), **244** (note), **299** (note), **302** (notes, 2), **307** (note), **308** (note), 364, **368** (note), **371** (note), **429, 432** (note), **434** (note), 491, 496, **564** (note).
Dwyer, P. S., 562.
Edmonston, J. H., *180*.
Esty, T. C., **119,** *242*.
Feinler, F. J., *363*.
Feld, J. M., 56, *182*, **244,** 246, **370,** *433*.
Finkel, B. F., 53, **428** (note), 496.
Fischer, C. H., **60.**
Ford, L. R., **119,** *180*, 433.
Foust, J. W., *120*.
Free, A. P., *608*.
Friedman, B., *563*.
Frink, O., 372, 610.
Fuller, A. E., *123*.
Gaines, R. E., 52, 60, 117, 121, 122, 563, 611.
Galbraith, A., 302.
Garver, R., *298*, **298.**
Gehman, H. M., *120*.
Gentry, F. C., *493*, *494*, *559* (*2*), *560*, *608* (*2*).
Gibson, Emma M., 428.
Goormaghtigh, R., *118*, *120*, *122*.
Graves, G. H., *370*.
Graves, R., *563*.
Green, H. G., *502*, 561, *563*, *564*.
Greenleaf, H. E. H., *112*, *176* (*2*), **492,** *494*.
Grossman, H. D., *180*, 298, 364, *370*, 501, 610.
Gunder, D. F., *119*, *120*, **120.**
Haas, A., *112*, *176*, *178* (*2*), 241, 295, 360, 560, 607.
Hadley, L., **501.**
Hall, D. W., 363.
Halperin, H., 561.
Hamilton, Mary, **559.**
H'Doubler, F. T., 610.
Heaslet, M. A., *425*.
Hill, J. D., *120*, **369.**
Hill, P. R., 491.
Hoffmann, B., **249.**
Hoover, W., **247,** *306*, *564*.
Householder, A., *246*, *502*.
Howe, J. P., *437*.
Huston, R. E., **184.**
Hutchinson, C. A., *613*.
Irwin, F., *502*.
Ivanoff, V. F., *61*, 110, 118, *120*, 241, 296, 298, **305,** 362, 363, 370, 429, 609.
Janes, W. C., *113* (*2*).
Johnson, Marie M., *58*.
Johnson, W. W., *613*.
Johnston, L. S., 115, 116, *176*, *178*, *182*, *242*, 300, **362,** *426*, *435*, *492*, *493*, 611.
Jones, S. I., 436.
Katz, D., *370*.
Kennedy, E. C., 241, 559, 606, *608*.
Kimball, B. F., 52, 497, **498,** 614.
Korgen, R. L., **177.**
Latshaw, E., *176*.
Lehmer, Emma T., *180*.
Leifer, H. R., *112*, *178*, *608*.
Leith, J. D., *371*, *428*, *434*, *437*.
Lev, J., *372*.
Levens, A. S., 364.
Lindquist, T., **242,** *297*, *370*, *426*, *492*, *493*, *608* (*2*).
Lorch, L., *608* (*2*).
MacKay, R., 116, *249*, **423,** *431*, *493*, **559,** *559*, *560*, *608* (*2*).
Maddox, A. C., *112*.
Manning, F. L., *176*, *434*, *493*, *494*, *559*.
Markowitz, M., *112*, **112,** 179, *431*, *435*, *437*.
Martin, A., 247.
Mary Bonaventure, Sister, *120*.
Mason, Ruth G., *370*, 427, *563*.
Mathewson, L. C., *370*, *563*.
McCarthy, J. T., *431*.
McCoy, N. H., 52, **246,** 613.
McDonald, Janet, *608*.
McLaughlin, J. A., *559*.
Medveson, L. Jr., *493*, *559*, *560*, **560, 608,** *609*.
Merrill, A. S., *120*, *434*.
Meyer, H. A., *434*.
Meyer, J. B., *298*, *435*, *613*.
Miller, J. S., *249*.
Miller, N., 243.
Miller, Pearl C., 423.
Mintzer, Ethel, *178*.
Molloy, C., *493*.
Montgomery, D., *120*.
Moody, Ethel I., **56.**
Moore, N. B., **612.**
Moritz, R. E., *120*, *180*, **248,** 248, **371,** 427, **433.**
Morley, F., 307, 496.
Morley, R. K., 110, 111, 112, *249*, 425 (2).
Moroh, S., 179.
Mrock, E., *426*.
Munshower, C. W., *426*, *559*.
Murray, V. F., *118*, *122*, **185,** *613*.
Musselman, J. R., 295, 608.
Oakley, C. O., 176.
Oergel, C. T., *559*, *608*.
Orange, W., *249*.
Ore, O., 496.
Parker, W. V., *58*, **181,** *182*, *372*.

Pelletier, A., *56, 119, 120, 249, 307, 370, 431, 433, 501, 502,* **563,** *563, 564.*
Perry, D. B., **369.**
Querry, J. W., **431.**
Ramler, O. J., *122, 180, 608,* **609.**
Ransom, W. R., *112, 113,* **113 (2),** 113, **114,** 175, *176, 178,* 241 (2), **242,** 295, *298,* **361,** 361, *362, 426, 493, 494,* 558, 559, *559, 560 (2),* 609.
Rasche, W. H., 58, 116, 179, 183, 243, 249, 363, 427, *433, 501,* 610 (2).
Raynor, G. E., 52.
Reid, W. T., *185.*
Reynolds, J. B., 53, 179, 185, 243, 305, **306,** (note), 363, 499.
Rhodes, C. E., *613.*
Richert, D. H., *113.*
Richtmeyer, C. C., *176, 242, 297, 493, 559, 609.*
Rider, P. R., 52, 612.
Roberts, B. D., 299, *370.*
Robinson, R., 558, 607, **607,** *608.*
Rosenbaum, J., 175, 243, *362,* 423, 428, *431,* **435,** 491, *492, 493,* 493, 495, 558, **560,** *560,* 561, *563,* 606.
Rosenman, M., 180, 184, 495, 562.
Ruderman, H. D., *119,* 175, *249, 435, 493.*
Rupp, C. A., *58,* **111,** *178, 307,* 360, *363, 435 497.*
Rust, W. M. Jr., *61, 120.*
Sanchez-Diaz, R., *559.*
Scheier, M. A., *120.*
Schoenberg, I. J., *185.*
Schub, P., **425.**
Schug, H. L., *119,* **180.**
Seitz, E. B., 53.
Shaw, A. A., 119.
Shively, L. S., *120.*
Shover, Grace, **607,** *613.*
Shu, S. S., *372.*
Slaught, H. E., 111.
Smiley, C. H., **562.**
Smith, F. C., *112.*
Smith, H. W., *120.*
Sosnow, G. Y., 182.
Sparks, F. W., *372.*
Spies, O. A., 177.
Spunar, V. M., 299.
Staley, R. C., *56, 120.*
Starke, E. P., 175, **176,** *178,* 492.
Stevenson, A. F., 610.
Sutton, R. M., 491, *608.*
Swift, E., *494,* **499.**
Taylor, Mildred E., *120.*
Thébault, V., 53, 116, 561.
Thompson, J. E., *297, 613.*
Thurston, H. S., 179, *372.*
Trevor, J. E., 115.
Turney, W. H., *437.*
Uhler, H. S., **297** (note).
Underwood, F., *59, 120, 122, 180,* **180,** *307,* **307,** *370, 372,* **372,** *431 (2), 434, 435, 437, 502, 564,* **611.**
Uspensky, J. V., **614.**
Vatriquant, S., *112, 176,* **178, 296,** *298, 362, 363, 423,* **424,** *425, 426 (2),* **432,** *492, 493,* **493,** *494,* **500,** *559 (2), 560 (2), 563, 608 (2) 609.*
Wad, E., 369.
Walter, R. N., *297, 363, 492, 493, 494, 559, 560, 609 (2).*
Ward, M., 51, 297, **297,** 364, **365,** 423, 495, **614.**
Weaver, J. H., *494.*
Weick, H., *176.*
Wernicke, P., *118, 119, 120, 180, 249, 307.*
West, J. M., 606.
Wheeler, A. H., *114.*
Whitford, E. E., *298, 362.*
Willey, Maud, 296, **609.**
Wilmer, F. L., **53, 54,** *184.*
Wilson, T. R. C., *120, 363.*
Winger, R. M., 110, 424, *431.*
Woods, R., **118, 122.**
Yanosik, G. A., 51, 296, 306.
Yates, R. C., *559 (2).*
Young, Margaret M., **182.**
Zander, L., *614.*
Zimmerman, B. C., *112, 178, 362, 608.*

PROBLEMS—SOLUTIONS

Numbers in **black-face** type refer to problems; those in light-face to pages.

E-1, 111–112; **E-2,** 112–113; **E-3,** 113; **E-4,** 113–114; **E-5,** 114; **E-6,** 175–176; **E-7,** 176; **E-8,** 177–178; **E-10,** 178; **E-11,** 241–242; **E-12,** 424; **E-13,** 559; **E-15,** 423; **E-16,** 296–297; **E-17,** 297–298; **E-18,** 361–362; **E-19,** 298; **E-20,** 362; **E-21,** 362–363; **E-22,** 424–425; **E-23,** 425; **E-24,** 425–426; **E-25,** 426; **E-26,** 492; **E-27,** 492–493, **E-29,** 493–494; **E-30,** 494; **E-31,** 559; **E-32,** 559; **E-33,** 560; **E-35,** 560; **E-36,** 607; **E-37,** 607–608; **E-38,** 608; **E-39,** 609; **E-41,** 609.
3340, 299–300; **3500,** 428–429; **3501,** 53; **3502,** 53–55; **3513,** 116–117, 300–302; **3516,** 243–246; **3517,** 364–369; **3522,** 302–304; **3525,** 55–56; **3527,** 117–118; **3528,** 180; **3529,** 118–119; **3530,** 119–120; **3531,** 120–121; **3532,** 121–122; **3533,** 122–123, **3535,** 56–58; **3536,** 180–181, 562; **3537,** 58–60; **3539,** 60–61; **3541,** 305–306; **3544,** 181–182; **3545,** 182–183; **3546,** 183–184; **3547,** 184–185; **3548,** 185–186; **3552,** 246–247; **3556,** 247–248; **3557,** 248–249; **3558,** 249; **3559,** 306–307; **3560,** 307–309; **3561,** 369–370; **3562,** 370–371; **3564,** 371–372; **3565,** 372–373; **3566,** 429–431; **3567,** 431–432; **3569,** 432–433; **3571,** 433–435; **3572,** 435; **3573,** 436–437; **3575,** 496–497; **3579,** 497–499; **3580,** 499–500; **3581,** 500–501; **3582,** 562–563; **3583,** 501–502; **3584,** 563; **3585,** 611–612; **3586,** 563–565; **3587,** 612–613; **3588,** 613–614; **3591,** 614–616.

NOTES AND NEWS

Academies, Associations, Congresses, Societies, etc.: American Society of Mechanical Engineers, 187; Conference of Engineers, 310; Econometric Society, 502; Institute of International Education, 187; International Conference of Applied Mechanics, 616; Mathematical Association of America, 309–310, 437, 502; Mathematical Association of America, Oklahoma Section, 373; National Research Council, 565.
Doctorates: 373–378.
National Research Fellowships: 566.
Prizes: American Association for the Advancement of Science Prize, 373; Annali della R. Scuola Normale Superiore di Pisa Competition, 437–438; Chauvenet Prize, 188; Charles Lagrange Prize, 310; Alfred Noble Prize, 373, Roosevelt Medal, 62; Rumford Medal, 616; Russel Award, 61.
Summer Courses: 311–314.
Colleges, Technical Schools and Universities: Chicago, 311; Columbia, 311; Cornell, 311; George Washington, 311; Illinois, 311; Iowa, 311–312; Johns Hopkins, 312; Kansas, 312; Kentucky, 312; Maine, 312; Massachusetts Institute of Technology, 312; Michigan, 312–313; Minnesota, 313; Northwestern, 313; Ohio, 313; Pittsburgh, 313; Southern California, 314; Stanford, 313–314; Syracuse, 314; Texas, 565; Vermont, 314; Wisconsin, 314.

PERSONAL MENTION

Abbott, G., 240.
Abel, J. J., 443.
Abernathy, J. R., 374.
Abrahami, M., 423.
Achenbach, Rachel, 387.
Ackley, H. M., 441.
Adama, W. F., 420.
Adams, A., 292.
Adams, C. R., 125, 136, 351, 441.
Adams, D. P., 440.
Adams, O. S., 189, 398.
Adkisson, V. W., 125.
Agnew, R. P., 119, 120, 125, 180, 441.
Aitchison, Beatrice, 125, 189.
Albert, A. A., 311, 503.
Albert, O. W., 318.
Alden, Barbara, 293, 294, 295.
Alexander, J. W., 250.
Allen, B. R., 120.
Allen, E. E., 318.
Allen, E. F., 118, 306, 373, 560.
Allen, E. S., 390, 391, 604.
Allen, Florence E., 567.
Allen, Martha, 493.
Allen, R. B., 383, 441.
Allen, Virginia, 239.
Alliot, E., 120, 185.
Alter, D., 418.
Altshiller-Court, N., 115, 135, 181, 243, 265, 357, 363, 373, 427, 432, 435, 495, 496, 500, 561, 610.
Ambrose, Alice L., 374.
Ames, L. D., 314, 318.
Anderson, A. E., 492, 493.
Anderson, Nola L., 441.
Anderson, W. E., 383, 415.
Andrews, Anna H., 135.
Anning, N. H., 320, 321, 322, 422, 495.
Apamian, A., 108.
Apostol, Panoria, 490.
Archibald, R. C., 125, 127, 139, 421.
Armour, Juanita, 108.
Armstrong, A., 421.
Armstrong, C., 604.
Armstrong, Jane, 357.
Arnold, H. E., 125.
Arnold, P. M., 172.
Arnoldy, Sister, Mary Nicholas, 374.
Arthur, J., 239.
Astrachan, M., 363.
Atanasoff, J. V., 503.
Atchison, C. S., 125.
Aude, H. T. R., 115, 120, 175, 370, 371, 423, 426, 492.
August, B. B., 238.
Aurelius, B., 120.
Ayer, G., 109.
Aylor, M. W., 174, 315, 398, 558.
Ayres, F. Jr., 117, 120, 125, 301, 372.
Ayres, H. C., 292.
Ayres, W. L., 61, 313, 320, 322, 487, 557.
Babcock, H. A., 147, 446, 447.
Babcock, R. W., 125, 316, 441.
Babcock, Wealthy, 316.
Bachman, W. C., 48.
Backman, J. E., 357.
Bacon, Clara L., 125, 189.
Bacon, H. M., 378.
Baker, Frances E., 441, 605.
Baker, G. A., 372, 441.
Baker, R., 239.
Baker, R. P., 49, 389.
Ball, N. H., 125, 374.
Ball, Ruth S., 293, 294.
Ballou, D. H., 440.
Bamberger, L., 128.
Bamforth, F. R., 383.
Banes, Gladys L., 394.
Barao, Mary S., 421.
Barber, S. F., 566.
Barbour, J. M., 69.
Bareis, Grace, 313, 383.
Barnard, R. W., 441.
Barnett, I. A., 188, 383, 441, 557.
Barnhart, C. A., 242.
Barr, C. F., 386, 387.
Barrow, D. F., 352.
Barry, A. F., 605.
Bartky, W., 311, 441.
Basoco, M. A., 105, 392.
Batcheler, J., 490.
Bateman, H., 318, 599.
Baten, W. D., 320, 441.
Battig, L., 567.
Bauer, G. N., 101.
Bauer, L. A., 135.
Beatley, R., 553.
Beatty, H. M., 383.
Beaty, Mildred, 176.
Beaver, R. A., 374.
Beckwith, E., 125, 441.
Beenken, May M., 174, 418, 567.
Beers, N., 107.
Beetle, R. D., 415.
Bejarano, G. G., 488.
Bell, C., 318.
Bell, E. T., 230, 287, 350, 450.
Bell, M. W., 238.
Benitz, P. A., 62.
Bennett, A. A., 48, 104, 125, 134, 136, 180, 409, 421.
Bennett, T., 118, 441.
Bentley, A. F., 39, 352.
Benton, T. C., 239, 346.
Berger, Eleanor, 421.
Bernstein, B. A., 441.
Bernstein, F., 438.
Berry, E. M., 58, 120, 436, 564.
Berry, Grace E., 318.
Berry, Guy, 387.
Besicovitch, A. S., 104.
Best, Jessie, 172.
Bettinger, A. K., 392.
Bettman, Doris, 490.
Beveridge, H. R., 441.
Bibb, S. F., 363.
Bickerstaff, T. A., 112, 176, 178.
Biggerstaff, J., 358.
Bill, E. G., 566.
Bingley, G. A., 189.
Birkhoff, G. D., 125, 129, 441, 444, 445, 446, 503.
Bjerknes, V., 230, 419.
Black, A. H., 374.
Black, Florence L., 316.
Black, L. T., 383.
Blair, H., 320, 321.
Blair, Vevia, 504.
Blake, A., 125, 179, 189, 398, 399.
Blanch, Gertrude, 249.
Blau, L. W., 379.
Bledsoe, J. M., 379.
Bleick, W. E., 503.
Blichfeldt, H. F., 441.
Blincoe, J. W., 182, 398.
Bliss, G. A., 311, 359, 415, 441, 445, 472, 605.
Bloodworth, Sarah, 420.
Blumberg, H., 125, 383.
Blumenthal, L. M., 379, 566.
Blydenburgh, May, 109.
Boas, F., 127.
Boden, R., 108.
Bohnenblust, H. F., 440.
Bohr, H., 104
Bohr, N., 61, 310, 443, 445.
Bompiani, E., 443, 444, 445.
Bordon, Sarah, 488, 489.
Börger, R. L., 250.
Borgman, W. M., 320.
Borofsky, S., 236.
Botsford, J. L., 182.
Bourath, Lucille, 108.
Bowden, J., 125, 490.
Bower, Julia W., 125, 441, 605.
Bowie, W., 61, 310.
Bowles, C. F., 441.
Boyce, Annabel S., 112, 176, 178, 608.
Boyce, Fannie W., 315, 441.
Boyce, M. G., 180, 370, 383, 384, 502.
Boyd, Lollie, 239.
Boyd, P. P., 312.

Boyer, R., 49.
Bradley, A. D., 415, 435, 501, 502.
Bradshaw, J. W., 312, 320.
Brady, C., 488.
Brady, J. J., 374.
Bramble, C. C., 189.
Branch, W. F., 421.
Brand, L., 173, 260, 445.
Brandeberry, J. B., 293, 320, 383.
Brandt, A. E., 390, 391.
Brauer, A., 409.
Bray, H. E., 379.
Breidenbach, W., 603.
Breiland, J., 176.
Brenke, W. C., 392.
Breuer, Elizabeth, 489.
Brick, B. R., 172.
Bridger, C., 559.
Brink, R. W., 415.
Brinkmann, H. W., 616.
Brittle, Susie, 421.
Britton, J., 386.
Brixey, J., 357.
Brixey, S., 357.
Brodie, W. M., 135.
Brooke, W. E., 101, 441.
Brooks, F. M., 173.
Brouwer, D., 616.
Brown, A. B., 101.
Brown, B. H., 295, 361, 417, 603, 607.
Brown, E., 310.
Brown, E. W., 502.
Brown, M. C., 604.
Brown, N. C., 133.
Brown, O. E., 62, 383, 415.
Browne, E. T., 333, 415, 503, 598.
Bruce, G. H., 1.
Bruce, Molly, 109.
Bruce, W. H., 554.
Bruen, Marian, 108, 109.
Bruton, G. S., 374.
Bryan, N. R., 125, 312.
Buchanan, H. E., 532.
Buckman, A. L., 124.
Buker, W. E., 112, 120, 176, 178, 242, 362, 363, 370, 425, 426, 493, 494, 559, 563, 608.
Bullard, J. A., 161, 314, 561.
Bullard, Persis, 294.
Bullock, R. C., 123, 374.
Bumer, C. T., 441.
Bunch, W. H., 251.
Bunyan, L. H., 240.
Burdick, O. Z., 315, 441.
Burgess, R. W., 125.
Burington, R. S., 383, 415, 441, 554.
Burke, W. E., 178.
Burnam, J. E., 379.
Bush, L. E., 173, 313, 566.
Bush, V., 187.
Bushey, J. H., 125, 238.
Bussey, W. H., 125, 129, 136, 441.
Butchart, J. H., 118, 374, 492, 559, 560, 566.
Butler, L. G., 358, 426.
Butler, T., 61, 120.
Butterfield, A. D., 314.
Byers, Eddis, 239.
Byrne, W. E., 125, 398.
Cain, S. A., 395.
Cairns, S. S., 63, 120, 125.
Cairns, W. D., 49, 125, 127, 139, 315, 441, 451, 566.
Calderhead, J. A., 437.
Calkins, Emily E., 449.
Calkins, Helen, 441.
Cameron, R. H., 125, 374, 566.
Camp, B. H., 125.
Camp, C. C., 130, 392, 537.
Campbell, A. D., 101, 103, 107, 314.
Campbell, G. A., 441.
Campbell, H. A., 55, 370.
Campbell, J. W., 441.
Campbell, Jessie R., 318
Campbell, W. B., 55, 58, 59, 122, 180, 186, 241, 307, 431, 433, 434, 502, 560.
Candy, A. L., 392, 393.
Cantor, G., 103.
Capron, P., 189, 398, 437.
Caris, P. A., 63, 64, 125, 230.
Carlen, Mildred E., 125.
Carlson, Elizabeth, 313.
Carlson, J. A., 292.
Carlson, J. F., 374.
Carmichael, G. N., 420.
Carmichael, R. D., 234, 311, 353, 441, 450, 566.
Carnahan, W. D., 490.
Carpenter, Helen, 108.
Carpenter, P. N., 292.
Carr, F. E., 383.
Carroll, I. S., 314.
Carroll, J., 357.
Carter, C. C., 243.
Carter, H. C., 107.
Carver, H. C., 313.
Carver, W. B., 125, 311, 558.
Case, Elizabeth, 239.
Case, J. E., 441.
Castles, Mary, 108.
Chace, A. B., 135.
Chambers, G. G., 125, 238.
Chandler, J. A. C., 421.
Charosh, M., 120, 123, 181, 242 296, 360, 362, 427, 502.
Chatterton, S. R., 421.
Cheney, W. F. Jr., 51, 111, 113, 114, 125, 135, 175, 178, 242, 298, 361, 362, 426, 441, 491, 494, 559, 606.
Chernick, J., 240.
Chisholm, R., 108.
Chittenden, E. W., 312, 389.
Church, A., 109, 240.
Church, W. R., 249.
Churchill, R. V., 313, 441.
Clack, R. W., 320.
Clair, H. S., 605.
Claire, C. N., 189.
Clark, A. G., 180, 386, 431, 434, 563.
Clark, C., 107.
Clark, C. E., 73.
Clark, E. K., 238.
Clark, J., 108.
Clarke, E. H., 49.
Clarkson, J. A., 120.
Clarkson, J. M., 374.
Claudette, Sister M., 315.
Clawson, J. W., 63.
Clement, Mary D., 294.
Clements, G. R., 441.
Coan, R. N., 240.
Coble, A. B., 125, 128, 136, 441, 445.
Cockerill, F., 107.
Codianni, Tina, 421.
Coe, C. J., 313, 320.
Coe, Kathryn, 108.
Coffin, L. M., 389, 441.
Cofield, Edna J., 420.
Cohen, A., 125, 189, 399.
Cohen, L. W., 50, 312, 441, 604.
Cohen, R. E., 238.
Cohen, T., 239.
Cohn-Vossen, S., 39.
Cole, Nancy, 504.
Coleman, J. B., 125, 441.
Collier, Myrtle, 318.
Collins, O. C., 120.
Colpitts, E. C., 358.
Colpitts, Julia T., 441.
Colpitts, Laura, 358.
Compton, A. H., 61, 443.
Compton, K., 565.
Condit, I. S., 50.
Conkwright, N. B., 312, 389, 390.
Conrad, Marie, 174.
Constable, Mary L., 63, 176, 362, 494, 608.
Conwell, H. H., 65, 374, 567.
Cook, R. H., 604.
Cook, W. O., 113.
Coolidge, J. L., 91, 437.
Coolidge, Mrs. J. L., 437.
Cope, Frances T., 374.
Cope, T. F., 125, 383.
Copeland, L. P., 125.
Copenhagen, Helen M., 292, 293.
Coral, M., 606.
Corey, S. A., 163, 363, 440, 608.
Corliss, J. J., 320.
Cotman, C. A., 49.
Court, N. A. See Altshiller-Court, N.
Cowles, A., 502.
Cox, W. E. Jr., 406.
Craig, A. L., 108.
Craig, A. T., 49, 312.
Craig, C. C., 313, 320.
Craig, C. F., 311.
Cramer, G. F., 120.
Crandell, F. F., 315, 383.
Crane, R., 183, 383, 386, 428, 435, 497.
Crathorne, A. R., 46, 230, 355, 418, 441.
Crawley, E. S., 63, 230.
Crew, H., 443.
Cristopher, S., 358.
Crowe, S. E., 320.
Crowley, W., 358.
Culmer, Orpha A., 189, 398.
Culver, M. M., 313.
Cunningham, Ruth, 488, 489.
Currier, A. E., 440.
Currier, C. H., 125, 421.
Curtis, H. L., 109.
Curtiss, D. R., 441, 562.
Curtiss, J. H., 440.
Cutler, E. H., 125, 441.
Cutting, L. H., 441.
Dalal, R. D., 315.
D'Amato, Flora, 490.
Dancer, W., 293, 320, 383.
Daniells, Marian E., 604.
Daniels, F., 1.
Dantzig, T., 125, 189, 230, 358, 398, 399.
Danzl, A., 449.
Darkow, Marguerite, 125, 238.
Daugherty, R. D., 316.
Daus, P. H., 318, 320, 489.
David, J. A., 490.
Davis, A., 174.
Davis, H. T., 47, 125, 383, 384, 386, 394, 502.
Davis, Mrs. H. T., 383.
Davis, J. E., 63, 125.
Davis, L. Jr., 299, 370, 431.
Davis, Lorene, 50.
Davis, W. M., 441.
Davison, Rachel, 449.
Dawes, R., 443.
Dean, Alice C., 379.
Dearborn, D. C., 315, 392.
Deck, L. J., 449.
Decker, F. F., 125, 238, 314.
DeCleene, L. A. V., 567.
Dederick, L. S., 189.
DeFoe, L. M., 440.
Defoe, O. K., 188.
DeLay, Bethel, 50.
DeLong, I. M., 240, 386.
Demos, M., 110.
Deuring, M. F., 440.
Dewees, G. M., 48.
Diamond, A. H., 374.
Dickel, H., 108.
Dickinson, C. N., 135.
Dickson, L. E., 40, 441, 444.
DiGiovanni, H. J., 605.
Diller, Violet, 557.
Dillingham, A., 189, 398, 399.
Dimick, C. E., 125.
Dines, L. L., 441, 566.
DoBell, H. A., 125, 238.
Donahue, J. E., 135.
Doob, J. L., 374, 566.
Dörrie, H., 416.

Dorroh, J. L., 125, 566.
Dorsett, Miss, 357.
Dorsett, Mr., 357.
Dostal, B. F., 125, 441.
Dotterer, J. E., 441.
Dougherty, Lucy T., 316, 318.
Douglas, J., 310, 439.
Douglas, W., 559.
Downing, F. A., 449.
Downing, H. H., 50, 312, 604.
Downs, T. L. Jr., 440.
Doyle, T., 292.
Dresden, A., 63, 125, 127, 129, 136, 422, 441, 445, 450.
Dresher, M., 48, 125, 133, 238.
Dubourdieu, J., 230.
Duerksen, J. A., 189, 398.
Dufford, R. T., 107.
Duke, V. L., 318.
Dumdie, V., 174.
Dumford, Margaret, 557.
Duncan, D. C., 298, 361, 449, 502, 562.
Duncan, F. O., 107.
Dunham, Anne, 294.
Dunkel, O., 56, 58, 59, 123, 135, 182, 244, 299, 302, 307, 308, 364, 368, 371, 429, 432, 434, 491, 496, 564, 616.
Dunlap, J. W., 44.
Dunnington, G. W., 316, 317.
Duren, W. L., 441.
Durgin, Margaret W., 109.
Dushnik, B., 320, 321.
Dustheimer, O. L., 382, 383.
Dutton, Caroline, 488.
Dwyer, P. S., 383, 562.
Dye, L. A., 125.
Earl, J. M., 392, 394.
Echols, W. H., 173, 398, 399.
Eddy, C. R., 421.
Edge, W. L., 349.
Edington, W. E., 394, 395, 441.
Edmonson, N., 379, 382.
Edmonston, J. H., 180, 189.
Edwards, Myrtle, 133.
Edwards, P. D., 394, 395, 398.
Edwards, R. P., 107.
Eells, W. C., 359.
Eide, Margaret C., 441.
Ein, Edith, 293.
Einstein, A., 438.
Eisenhart, L. P., 125, 127, 128, 415, 503.
Eisler, S., 49.
Elder, J. D., 320.
Elliott, S. E., 490.
Emberson, R., 107.
Emmons, C. W., 389, 390.
Emmons, L. C., 320.
Engstrom, H. T., 315.
Enriques, F., 230.
Epstein, Jesse, 557.
Ericson, H., 65.
Ernsberger, Iva B., 318.
Escott, E. B., 441.
Esty, T. C., 119, 242, 439.
Evans, G. C., 125, 129, 131, 379, 439.
Evans, G. W., 125.
Evans, H. B., 238.
Evans, H. P., 314, 441.
Everett, H. S., 125, 238, 310, 441, 445.
Everett, J. P., 320.
Ewin, Mary, 398.
Ewing, C. A., 415, 600.
Ewing, D., 490.
Eyre, Virginia, 557.
Eyring, H., 373.
Fairbanks, Edythe, 294.
Farnum, Fay, 124.
Fattu, N., 315.
Fawcett, H. P., 250.
Federico, P. J., 358, 398.
Feinler, F. J., 125, 133, 363, 383, 441.
Fejér, L., 309, 399, 438, 443, 444, 445, 502.
Feld, J. M., 36, 56, 182, 244, 246, 370, 433.
Fenichel, S., 240.
Ferrell, D., 50.
Field, P., 313, 320.
Field, P. M., 238.
Fields, J. C., 135, 617.
Finan, E. J., 238.
Fink, G., 604.
Finkel, B. F., 53, 135, 136, 237, 428 441, 496.
Fischer, C. H., 49, 60, 124, 282, 375 441.
Fischer, P. B., 171.
Fisher, Blanche, 239.
Fisher, D. B., 358.
Fisher, F., 488.
Fisher, I., 125, 502.
Fiske, H. W., 250.
Fiske, T., 109, 240.
Fite, W. B., 311, 605.
Fitterer, J. C., 387.
Fitzpatrick, J. D., 392.
Fleisher, E., 599.
Fleming, J. A., 315.
Flexner, A., 128.
Flood, M. M., 125.
Foard, C. W., 383.
Focke, T. M., 49, 383.
Foraker, F. A., 313.
Ford, L. R., 119, 180, 379, 380, 433.
Ford, W. B., 134, 320, 450.
Fort, T., 48, 63, 125, 129, 136.
Foster, A. L., 504.
Foust, J. W., 120.
Fox, A. H., 441.
Franklin, P., 143, 415.
Franz, E. W., 449.
Fraser, W., 604.
Fréchet, M., 42.
Free, A. P., 608.
Frey, Marian, 49.
Friedman, B., 563.
Friedman, M., 240, 557.
Frink, O. Jr., 63, 64, 372, 610.
Frisard, Olga, 239.
Frisch, R., 502.
Frizzell, Ruth, 604.
Fry, E. M., 239.
Fry, T. C., 48, 125, 441, 446.
Fuller, A. E., 123.
Fulton, D. G., 375.
Furr, R., 240.
Gaba, M. G., 392, 441.
Gage, W. H., 503.
Gaines, R. E., 52, 60, 117, 121, 122, 563, 611.
Galbraith, A., 302.
Gale, A. S., 125.
Gānguli, S., 25, 154.
Garabedian, C. A., 602.
Gardipee, L., 174.
Garrett, Boyce, 420.
Garrett, G. A., 379.
Garrett, J. A., 269.
Garrett, W. H., 316, 441.
Garver, R., 77, 298, 318, 440, 488.
Gaskell, R. E., 320.
Gassett, Miss, 357.
Gaver, H. H., 318.
Gehman, H. M., 120.
Geis, Hazel, 490.
Geller, H., 240.
Gentry, F. C., 493, 494, 559, 560, 608.
Gergen, J. J., 440.
Gerst, F. J., 125.
Getchell, B. C., 320.
Gewertz, C. E. M., 375.
Gibbens, Gladys, 313.
Gibson, Emma M., 428.
Gill, B. P., 237, 441.
Gillespie, D. C., 125, 311, 442.
Gillman, R. E., 135, 421.
Gingery, W., 490.
Gingrich, C. H., 442.
Givens, J. W. Jr., 173.
Glazier, Harriet E., 230, 318, 418, 488.
Gleason, J. M., 318.
Gleser, S., 172.
Glover, B. C., 383.
Glover, J. W., 320.
Gold, J. S., 63, 125.
Goldberg, M., 63, 125, 189, 359.
Golz, Loretta, 174.
Goodman, Hazel, 239.
Goormaghtigh, R., 118, 120, 122.
Gordon, Anna B., 50.
Gordon, Sarah, 490.
Gore, G. D., 375.
Gorrell, G. W., 387.
Gottlieb, M. J., 107.
Gouwens, C., 389, 390, 442, 604
Graber, M. E., 389.
Grady, J., 109.
Graham, W. P., 357.
Granade, Mary C., 420.
Grant, E. D., 394.
Grant, H. S., 240.
Grant, J. D., 31, 135.
Graustein, W. C., 439, 442, 444.
Graves, C. H., 605, 606.
Graves, G. H., 370.
Graves, H. F., 604.
Graves, L. M., 311, 442, 605.
Graves, R., 563.
Green, H. G., 502, 561, 563, 564.
Green, L., 605.
Green, R. L., 124, 135.
Greenbaum, M., 605.
Greenleaf, H. E. H., 112, 176, 375, 492, 494.
Grenspan, M., 605.
Greville, T. N. E., 442, 449.
Griffin, F. L., 442.
Grossman, H. D., 180, 219, 298, 364, 370, 501, 610.
Grove, C. C., 47.
Grove, V. G., 320.
Grummann, H. R., 172
Guggenbuhl, Laura, 62.
Guitterman, A., 295.
Gummere, H. V., 63, 125.
Gunder, D. F., 119, 120.
Gurney, L. E., 314.
Guse, W. C., 172.
Guthe, C., 321, 322.
Gwinn, I. J., 389.
Gwinner, H., 125, 189.
Haas, A., 112, 176, 178, 241, 295, 360, 560, 607.
Hadley, J. R., 133.
Hadley, L., 501.
Hagen, Beatrice L., 315, 442.
Haggard, H. W., 442.
Hagler, E. E., 359.
Hahn, H., 39.
Hall, D. W., 363.
Hall, Elizabeth, 239.
Hall, F. C., 124, 250.
Hall, H., 375.
Hall, Shirley, 239.
Haller, Mary E., 292, 293.
Hallett, W. N., 449.
Halperin, H., 561.
Hamilton, Mary, 559.
Hancock, Clara, 442.
Hancock, H., 230, 383, 442, 557.
Hansen, A. H., 502.
Hardy, G. H., 134, 188.
Hardy, J. G., 40, 289.
Harmon, H., 606.
Harrell, E. G., 49.
Harrington, C. E., 422.
Harris, Elizabeth, 172.
Harris, G., 557.
Harris, Isabel, 399.
Harry, C. H., 126, 133, 189, 375.
Harshbarger, W. A., 316.
Hart, Lavira, 108.
Hart, W. L., 126, 134, 136, 415, 442, 600.
Hart, W. W., 442, 451, 567.
Hartley, M. C., 133, 375.
Hartman, B. K., 605.

Hartman, Ethel, 421.
Hartung, M. L., 314, 442, 567.
Hassler, J. O., 356.
Hauland, Alma M., 420.
Havens, G. G., 375.
Hawley, Marianne, 358.
Hayes, G. M., 449.
Hayes, J. J., 449.
Hayford, Phyllis, 488.
Hazeltine, A., 503.
Hazlett, Olive C., 442.
H'Doubler, F. T., 610.
Heaslet, M. A., 425.
Hebel, I. L., 315, 387.
Hedlund, G. A., 566.
Hedrick, E. R., 39, 126, 127, 130, 170, 238, 318, 358, 442.
Heineman, Helen, 357, 358.
Hemke, P. E., 49.
Henderson, A., 503.
Henderson, R., 126.
Hensen, W., 108.
Henyey, L. G., 49.
Herget, P., 557.
Herpel, C., 239.
Herr, Gertrude A., 389, 390, 604.
Hestenes, M. R., 375, 415, 566, 605.
Hickock, C. L., 240.
Hilbert, D., 39.
Hildebrandt, E. H. C., 133, 375, 394, 442.
Hildebrandt, Martha, 442.
Hildebrandt, T. H., 313, 320, 442, 547.
Hildner, R. C., 383.
Hill, A. L., 392, 394.
Hill, Dorothy, 490.
Hill, Isabel, 490.
Hill, J. D., 120, 369.
Hill, L. S., 505.
Hill, P. R., 491.
Hille, E., 439.
Hirschler, E. J., 383.
Hobson, E. W., 599.
Hodge, F. H., 394, 395, 442.
Hoffmann, B., 249, 375.
Hogan, M., 357.
Holgate, T. F., 442, 448, 449.
Holl, D. L., 604.
Hollcroft, T. R., 126.
Holloway, W. R., 442.
Hoover, W., 247, 306, 564.
Hopf, E., 124, 129.
Hopfner, F., 39.
Hopkins, L. A., 313, 320.
Hopper, Grace M., 616.
Horsfall, I. O., 126, 375, 503.
Hostetter, I., 292.
Hotaling, E. G., 421.
Hotelling, H., 502.
Houck, Charlotte, 422.
Householder, A., 246, 316, 502.
Hove, E. Marie, 449.
Howard, C. M., 379.
Howe, J. P., 437.
Howie, J. M., 392.
Hu, K. S., 375.
Huddleston, Doris, 239.
Huff, Dorothy, 356, 357.
Huffer, R. O., 567.
Huffman, Emma, 174.
Hughes, Jewell C., 129, 442.
Hull, R., 375, 566.
Hume, A., 124, 188.
Humphrey, Mr., 357.
Hunt, G. H., 318.
Hunt, Mildred, 358.
Huntington, E. V., 126, 136, 439, 442, 446, 451.
Huntley, H. B., 240.
Hurd, C. C., 604.
Hurst, J. W., 615.
Hurwitz, W. A., 311.
Huston, R. E., 184, 375.
Hutchings, W., 488.
Hutchinson, C. A., 387, 413, 482, 613.
Hutchinson, J. I., 311.
Hyde, Emma, 316.
Hyers, D., 488, 489.
Ingalls, E. E., 320, 321.
Ingold, L., 107, 126, 238.
Ingraham, M. H., 126, 310, 314, 442, 567.
Irwin, F., 502.
Irwin, H. H., 358.
Isaacs, C. A., 358.
Ivanoff, V. F., 61, 110, 118, 120, 241, 296, 298, 305, 362, 363, 370, 429, 609.
Jackson, D., 126, 127, 313, 442, 444.
Jaeger, C. G., 318.
James, Audrey, 239.
James, H., 239.
James, R. D., 134, 375, 442, 566.
Janes, W. C., 113, 316.
Janson, Edith V., 421.
Jekel, A. H., 135.
Jenne, D., 358.
Jensen, C. M., 442.
Jensen, Myra, 292.
Jessup, Claudia E., 293, 294.
Joffe, S. A., 442.
Johansson, C. E., 444.
John, F. W., 124.
Johnson, Bessie, 557.
Johnson, Louise, 387.
Johnson, Marie M., 58, 442.
Johnson, N., 124.
Johnson, R. A., 135, 421, 554.
Johnson, R. P., 126.
Johnson, W. W., 613.
Johnston, F. E., 189, 311, 358, 399.
Johnston, L. S., 115, 116, 176, 178, 182, 242, 300, 362, 426, 435, 492, 493, 596, 611.
Jonah, F. C., 383.
Jones, B. W., 126, 135.
Jones, E. H., 379.
Jones, Margaret E., 383.
Jones, Olive M., 442.
Jones, S. I., 236, 436.
Jordan, H. E., 316.
Jordan, M. F., 312, 419.
Jose, P. D., 357.
Joslin, Mabel, 108.
Joyal, H. J., 109.
Joyner, Lucile, 239.
Jurgensen, R., 489.
Justin, E. M., 383, 442.
Kachur, Nina, 174.
Kaelin, G. R., 134.
Kalbfell, D., 489.
Kalcik, G. J., 449.
Kaltenborn, H. S., 320.
Kamke, Jane, 293.
Karapetoff, V., 616.
Kardonsky, Elsie, 421.
Karpinski, L. C., 313, 320, 442, 443, 448.
Karr, Lois, 442.
Kasner, E., 188, 310, 311, 439, 489.
Katz, D., 370.
Kaufmann, I., 240.
Kearney, Dora E., 389.
Keffer, R., 126, 129, 130, 134.
Keiffer, Mildred, 557.
Keller, M. W., 375.
Kellogg, O. D., 135.
Kells, L. M., 39, 102, 189, 399.
Kempner, A. J., 42, 126, 240, 387, 455.
Kendall, Claribel, 387.
Kennedy, E. C., 241, 411, 559, 606, 608.
Kennedy, Evelyn M., 134, 442, 557.
Kennedy, Lottie, 239.
Kennelly, A. E., 442.
Kenyon, V. F., 421.
Kersten, H. J., 442.
Kester, G., 174.
Ketchum, P. W., 311.
Kichline, W., 110.
Kimball, B. F., 52, 497, 614.
Kimball, S. H., 376, 449.
Kimball, W. S., 320.
King, R. W. P., 376.
Kinney, J. M., 442.
Kirk, J. H., 50.
Kirkham, W. J., 442.
Kjontvedt, Selma, 489.
Klein, F., 39, 170.
Klein, S., 557.
Kline, J. R., 63, 126, 129.
Klinger, E. L., 394.
Klipple, E. C., 376.
Knebelman, M. S., 126.
Knedler, P. A., 63, 126, 238
Knight, L. C., 383.
Knox, K., 292, 293.
Kommerell, K., 44.
Kommerell, V., 44.
Koopman, B. O., 315.
Korgen, R. L., 177.
Kovalenko, M. S., 449.
Krall, H. L., 376.
Krathwohl, W. C., 442.
Krebs, C., 108.
Kreider, O. C., 389.
Krepleever, Mary, 293.
Kreth, D., 389.
Krumbein, W. C., 606.
Kryder, Lylah, 135.
Kuhn, H. W., 383.
Kuiper, J., 604.
Kurtz, A. K., 44.
Kusner, J. H., 376.
Lacher, J. R., 240.
Ladner, A. C., 383.
Lady, C. H., 449.
Lamb, W. E., 488.
Lambert, W. D., 126, 189, 399, 442.
Lamson, K. W., 503.
Landis, W. W., 126.
Landry, A. E., 399.
Lane, E. P., 442, 568.
Lane, Ruth, 312.
Lang, Louise, 421.
Langer, R. E., 442, 567.
Langford, C. H., 39.
Langhaar, J. W., 48.
Langmuir, I., 61, 439.
Langsdorf, A. S., Jr., 172, 173.
Langston, L., 379, 380.
Langtry, W. A., 172.
LaPaz, L., 383, 442.
Larew, Gillie A., 399, 442.
Larson, S., 489.
Lasater, Claire, 358.
Lasley, J. W., 415, 598.
Lasser, A., 315.
Latimer, C. G., 312, 442, 604.
Latshaw, E., 176.
Latshaw, V. V., 63, 126, 442.
Lee, Doris, 358.
Lee, W., 489.
Lefschetz, S., 126, 232, 250.
Legg, Harriet A., 421.
Lehmann, C. H., 605.
Lehmann, Cecelia, 172.
Lehmer, D. H., 127, 165, 188, 401, 442, 444, 446, 448.
Lehmer, D. N., 136, 442.
Lehmer, Emma T., 180.
Lehr, Marguerite, 63, 64, 126.
Leib, D. D., 126.
Leifer, H. R., 112, 178, 608.
Leighton, W. Jr., 440.
Leith, J. D., 371, 428, 434, 437.
Leon, Alice K., 490.
LePage, C. B., 187.
Lester, Caroline A., 126, 442.
LeStourgeon, M., 50, 312.
Lev, J., 372.
Levens, A. S., 364.
Levi-Civita, T., 229, 309, 438, 443, 444, 445.
Levy, H., 230, 311.
Levy, Sophia, 488.
Lewis, A. J., 376, 387, 389.
Lewis, C. F., 316.
Lewis, C. I., 39.
Lewis, D. C., 376, 566.
Lewis, F. A., 420.

Lewis, Florence P., 189, 442.
Lewis, Nancy D., 50.
Lewon, R., 108.
Leyde, Grace, 358.
Libby, W. F., 216.
Lieber, Lillian R., 126.
Lindquist, T., 242, 297, 320, 370, 426, 492, 493, 608.
Lindsey, I., 174.
Linfield, B. Z., 91, 92, 173, 189, 190, 399, 400.
Linhart, G. A., 318.
Link, Alice, 422.
Littauer, S. B., 290.
Little, E. M., 108.
Livingston, Edna, 239.
Livingston, G. R., 318.
Lloyd, Mazie C., 357.
Logsdon, Mayme I., 136, 230, 311, 394, 442, 445, 486, 605.
Long, F., 108.
Long, Florence, 394.
Lorch, E. R., 566.
Lorch, L., 608.
Love, C. E., 320.
Love, T. J., 449.
Loveridge, L. E., 449.
Lowenstein, L. L., 126.
Lowry, Etta, 239.
Lubin, C. I., 126.
Luck, J. J., 173, 189, 399.
Lufkin, H. M., 238.
Lunn, A. C., 311, 442.
Luteyn, P., 288.
Luther, C. F., 134, 376.
Lutz, Juna M., 394, 395.
Lyle, R. R., 422.
Lyngass, B., 174.
Lytle, E. B., 311.
Lyttle, J. B., 605.
MacAilister, R., 389.
Macaulay, W. H., 352.
MacCullough, R. H., 126, 383.
Macdonald, S. L., 387.
MacDonough, J. H., 240.
MacDuffee, C. C., 126, 134, 238, 383.
MacKay, R., 116, 249, 423, 431, 493, 559, 560, 608.
Mackie, E. L., 566.
MacLane, S., 440.
MacMartin, Christine H., 134.
MacMillan, W. D., 357, 442.
Mac Neish, H. F., 126, 238.
Madden, Rhoda, 421.
Maddox, A. C., 112.
Maier, Alice, 108.
Maier, W. E., 395.
Manchester, R. E., 383.
Mancill, J. D., 420.
Manley, Mary, 107.
Manning, F. L., 63, 176, 434, 493, 494, 559.
Manning, W. A., 313.
March, H. W., 134, 314.
Marden, M., 134, 442, 567.
Markowitz, M., 112, 179, 431, 435, 437.
Marm, Anna, 442.
Marriott, R. W., 63.
Marshall, E. W., 129, 130.
Martin, A., 247.
Martin, M. H., 376, 566.
Martin, Mary C., 442.
Martin, R. S., 376, 566.
Mary Bonaventure, Sister, 120.
Mary Cordia, Sister, 134.
Mason, Ruth G., 370, 376, 427, 442, 563, 606.
Mason, W., 488, 489.
Mason, W. E., 318.
Mathewson, L. C., 370, 563.
Mathias, Florentina, 383.
Mathis, Buena, 604.
Matthew, D., 421.
Matthews, E., 488.
Maverick, L. A., 318.
McAlister, E. H., 180.
McCallum, Margeret, 108.
McCarthy, J. T., 431.
McCoy, Dorothy, 126, 442.
McCoy, N. H., 52, 126, 246, 613.
McDaid, R. F., 321.
McDill, R. M., 392.
McDonald, Janet, 608.
McDonough, D. L., 63, 126.
McDougle, Edith, 63, 442.
McEwen, G. F., 318.
McFarlan, L., 292.
McFarland, Dora, 356.
McGaw, F. M., 389, 390, 391.
McGiffert, J., 442.
McGregor, Miss, 357.
McLaughlin, Isabel C., 62.
McLaughlin, J. A., 559.
McLendon, Julia, 239.
McMaster, A. S., 387.
McMillan, Mary B., 567.
McShane, E. J., 440.
Mears, Florence M., 189, 359, 399.
Meder, A. E., 124, 126, 503.
Medgyesy, L., 445.
Medveson, L. Jr., 493, 559, 560, 608, 609.
Merrill, A. S., 120, 224, 434.
Merrill, Helen A., 230, 294, 295, 504, 602.
Messick, C. A., 442.
Mewborn, A. B., 134.
Meyer, H. A., 394, 434.
Meyer, J. B., 298, 435, 613.
Michal, A. D., 318.
Middlemiss, R. R., 172.
Middleswart, F. F., 566.
Miles, E. R. C., 566
Miller, B., 238.
Miller, D. C., 127.
Miller, E. B., 442.
Miller, F. H., 504.
Miller, G. A., 4.
Miller, J. A., 63.
Miller, J. S., 249.
Miller, N., 243.
Miller, Pearl C., 423.
Miller, W. I., 442.
Miller, W. M., 126.
Milligan, R. A., 62.
Millikan, R. A., 310, 565.
Millington, H. G., 314, 442.
Mills, F. C., 502.
Milne, W. E., 322.
Mintzer, Ethel, 178.
Mitchell, A. K., 153.
Mitchell, C., 557.
Mitchell, H. H., 63, 64, 126.
Mitchell, U. G., 312, 316.
Moes, F., 174.
Molina, E. C., 126, 130, 442.
Molloy, C., 493.
Montague, Harriet F., 422.
Montgomery, D., 49, 120, 566.
Moody, Ethel I., 56, 126, 399, 442.
Moore, C. N., 126, 127, 383, 384, 442, 444, 557, 600.
Moore, E. H., 62.
Moore, L. T., 171.
Moore, N. B., 612.
Moore, R. L., 100, 239.
Moore, T. W., 394, 442.
Moore, W. L., 604.
Moran, C., 110.
Morenus, Eugenie M., 126, 399, 442.
Moritz, R. E., 120, 180, 248, 292, 371, 427, 433, 442.
Morley, F., 307, 496.
Morley, R. K., 110, 111, 112, 249, 425.
Moroh, S., 179.
Morrill, W. K., 126, 189.
Morris, C. C., 383.
Morris, M., 383, 415.
Morris, R., 63, 126, 240, 442.
Morris, S. S., 442.
Morse, M., 126.
Mortson, Dorothy, 174.
Mosesson, Z. I., 440.
Moskovitz, D., 376, 592.
Mossman, Thirza A., 442.
Moulton, E. J., 136, 442, 445.
Moulton, F. R., 235.
Moursund, A. F., 376.
Mrock, E., 426.
Mullins, G. W., 126.
Munn, H., 134.
Munro, R. J., 134.
Munshower, C. W., 426, 559.
Murnaghan, F. D., 126, 189, 312, 349, 399.
Murray, V. F., 118, 122, 185, 613.
Musselman, J. R., 43, 44, 135, 157, 295, 383, 480, 608.
Myers, H. S., 316.
Myers, R. J., 35.
Myers, S. B., 376.
Napier, B., 49.
Nason, P., 489.
Nassau, J. J., 383.
Nathan, D. S., 566.
Naylor, Donnabelle, 490.
Neal, Emily A., 293, 294.
Nedelsky, L., 376.
Neelley, J. H., 39, 235.
Nelson, A. L., 320.
Nelson, C. A., 63, 109, 126, 289, 487.
Nelson, W. K., 387.
Ness, Marie M., 126.
Neubauer, Greta, 387.
Neville, Betty, 240.
Newlin, R. L., 383.
Newsom, Mardelle, 134.
Nichols, G. D., 392.
Noble, C. A., 39, 170.
Noble, Helen, 357.
Nordgaard, M. A., 126.
Norlie, O. M., 124.
Norris, Marianne, 421.
Norris, R. E., 449.
Northcott, J. A., 415, 600.
Northrop, F. S. C., 174.
Norton, J., 357.
Novak, J. D., 605.
Nowell, Katherine, 239.
Nowlan, F. S., 230, 315, 355.
Nowlan, Mabel I., 449.
Nutter, D. S., 107.
Nyswander, J. A., 320.
Oakley, C. O., 126, 176, 421, 442.
Odoms, Alta, 557.
Oergel, C. T., 559, 608.
Oglesby, E. J., 174, 399.
Oldenburger, R., 49.
Ollivier, A., 389.
Olson, Emma J., 376.
Olson, H. L., 126, 135, 320, 442.
Orange, W., 249.
Ore, O., 126, 129, 419, 496, 502.
Osgood, W. F., 503.
O'Toole, A. L., 566.
Overman, P. W., 395.
Owens, F. W., 63, 442.
Owens, Mrs. F. W., 63, 442.
Oxtoby, J., 488.
Paddock, Ramona, 174.
Paley, R. A. E. C., 440.
Pall, G., 10.
Palmeter, D. B., 604.
Paradiso, L. J., 126, 170.
Parker, J. R., 49.
Parker, W. V., 58, 181, 182, 372.
Parkinson, G. A., 64, 65, 567.
Parks, Enzia, 293.
Partridge, Elizabeth A., 421.
Paxton, E. K., 399.
Payne, F., 395.
Pell, Emma, 358.
Pelletier, A., 56, 119, 120, 249, 307, 370, 431, 433, 501, 502, 563, 564.
Pennell, W. O., 172, 173.
Pepper, P., 557.
Perkins, D., 109.
Perron, O., 484.
Perry, D. B., 369.

Persons, Francis, 357.
Peters, A. S., 449.
Peterson, O. J., 315, 316.
Peterson, Ruth, 358.
Peterson, Thelma, 358.
Petrie, Ethel, 109.
Pettersen, C. A., 135.
Pettit, H. P., 64, 65, 288, 567, 568.
Phelps, W. L., 502.
Philip, M., 40, 230.
Philips, A. W., 316.
Phillips, Elizabeth, 108, 109.
Phillips, H. B., 230, 349.
Phillips, R., 489.
Pierce Jesse, 383.
Pierce, T. A., 392.
Pirenian, Z. M., 442.
Pixley, H. H., 442.
Plant, L. C., 320.
Plimpton, G. A., 444.
Plummer, Lois, 422.
Pollock, S., 444.
Polys, G., 314.
Poor, V. C., 313.
Popoff, K., 39, 234.
Porter, J. G., 440.
Porter, W. H., 421.
Potterfield, Elizabeth, 421.
Pound, V. E., 422.
Powell, J. E., 320.
Powlesland, Zora, 293.
Pretz, P. S., 316.
Price, G. B., 126, 376, 440.
Price, Irene, 134, 174, 377, 567.
Pruess, Marianne, 604.
Puckett, W. T. Jr., 173, 315, 399.
Purcell, E. J., 377.
Purdie, K. S., 399.
Quade, C. O., 172.
Queen, H. J., 605.
Querfeld, D. W., 442.
Querry, J. W., 49, 431.
Quigg, Gladys, 239, 449.
Quirk, Mary Helena, 421.
Raab, A. W., 377.
Rado, T., 313, 383, 442.
Ragland, Elizabeth, 50.
Rahke, F., 490.
Rainich, G. Y., 289, 313, 320, 321.
Rainville, E. D., 387, 388.
Raiser, T., 240.
Ramler, O. J., 122, 180, 399, 608, 609.
Ramsdell, G. E., 126.
Randels, W., 97.
Ransbarger, C., 356, 357.
Ransom, W. R., 112, 113, 114, 126, 175, 176, 178, 241, 242, 295, 298, 361, 362, 426, 442, 493, 494, 558, 559, 560, 609.
Rapp, Edith, 108.
Rasche, W. H., 58, 116, 179, 183, 243, 249, 363, 427, 433, 501, 610.
Rasor, S. E., 313, 383.
Rathart, Florence, 490.
Raudenbush, H. W. Jr., 126.
Rausch, S., 358.
Rawlins, C. H., 189.
Raynor, G. E., 52, 63, 126, 285.
Read, C. B., 449.
Rechard, O. H., 126, 387.
Recht, A. W., 387.
Rees, C. J., 63.
Rees, E. L., 604.
Rees, Mina S., 126, 238, 420, 485.
Rees, P. K., 379.
Rees, W. A., 379.
Reeves, Inez, 239.
Regan, Francis, 377.
Reid, W. T., 185, 442.
Redemeister, K., 487.
Reilly, J. F., 49, 312, 389, 390, 392, 503.
Reingold, H., 557.
Reinman, Dorothy, 293, 294.
Reinsch, B. P., 379, 381, 504.
Reising, J. A., 394.
Remick, B. L., 316.
Renier, M., 187.
Reno, V., 240.
Rex, E., 292.
Reynolds, J. B., 53, 179, 185, 243, 305, 306, 363, 499.
Reynolds, Lena E., 318.
Reynolds, T. W., 605.
Reynolds, W. F., 189.
Rhodes, C. E., 126, 377, 442, 613.
Rice, Ethel A., 134, 387.
Richardson, Elizabeth, 294.
Richardson, R., 489.
Richardson, R. G. D., 126, 421, 442.
Richert, D. H., 113.
Richeson, A. W., 542.
Richtmeyer, C. C., 176, 242, 297, 320, 493, 559, 609.
Rider, P. R., 52, 172, 612.
Rietz, H. L., 46, 126, 130, 230, 389, 443.
Rietz, J. C., 46.
Rightmire, B., 173.
Rigrod, W. W., 605.
Ritt, J. F., 126, 233, 439, 443.
Robbins, C. K., 394, 395.
Roberts, B. D., 299, 370.
Roberts, H. B., 392.
Roberts, J. H., 557.
Roberts, W., 488, 489.
Robertson, F., 394, 395.
Robinson, R., 350.
Robinson, R. M., 488, 558, 607, 608.
Robinson, W. H., 450.
Roe, Alice M., 109, 110.
Roever, W. H., 126, 238, 439.
Roos, C. F., 126, 373, 502, 616.
Roosevelt, F. D., 565, 566.
Root, R. E., 189.
Roots, Y. K., 383.
Rose, Mary, 108.
Rosen, N., 377.
Rosenbach, J. B., 415.
Rosenbaum, J., 175, 243, 362, 423, 428, 431, 435, 491, 492, 493, 495, 558, 560, 561, 563, 606.
Rosenberg, Anne, 108.
Rosengarten, G., 63.
Rosenman, M., 180, 184, 495, 562.
Ross, E., 239.
Rosskopf, M. F., 126.
Rossman, K., 293.
Roth, W. E., 443, 567.
Rothrock, D. A., 394, 443.
Roullet, H., 42.
Roulton, J. A., 63.
Rouse, L. J., 313, 320.
Rowe, C. H., 91.
Rowland, S. A., 383.
Ruderman, H. D., 119, 175, 249, 435, 493.
Runge, Lulu, 392, 443.
Running, T. R., 320.
Rupp, C. A., 58, 111, 178, 239, 307, 360, 363, 435, 497.
Rusk, W. J., 389.
Russell, Beulah, 399, 421.
Russell, G. B., 421.
Russell, H. N., 127, 439.
Russell, Helen G., 377.
Rust, W. M. Jr., 61, 120.
Rutherford, D. E., 105.
Rutt, N. E., 313.
Sabin, Mary S., 387.
Safford, F. H., 126.
Saks, S., 173.
Salkover, M., 167, 503.
Sanchez-Diaz, R., 559.
Sanger, R. G., 135, 443, 605.
Sard, A., 440.
Sargent, C. G., 421.
Schaaf, W. L., 46.
Scheier, M. A., 120, 126.
Schlegel, Rose, 174.
Schmeiser, Mabel F., 392.
Schmellner, H. N., 134.
Schnitzler, Edna, 108.
Schoenberg, I. J., 126, 134, 185.
Schoonmaker, Hazel E., 126, 443.
Schreiber, E. W., 443.
Schrenck, W. T., 1.
Schub, P., 126, 425.
Schuck, O., 238.
Schug, H. L., 119, 180.
Schuttler, Rita, 174.
Scott, W. G., 557.
Scott, W. M., 420.
Secrest, Jane, 358.
Seely, Caroline E., 126.
Seidel, W., 126, 440.
Seidlin, J., 126.
Seitz, E. B., 53.
Sell, W., 420, 555.
Seps, M., 293.
Service, J. H., 124.
Settles, R., 490.
Shallenberger, G. D., 108.
Shapiro, F., 605.
Shapley, H., 127, 616.
Sharpe, F. R., 311.
Shaw, A. A., 119.
Shaw, J. B., 311.
Shaw, R. S., 126.
Sheffer, I. M., 126.
Shell, N. F., 316.
Shellenbarger, R. C., 320.
Shelton, Eleanor, 239.
Sherer, C. R., 379.
Sherman, J., 377.
Sherwood, C. S. III., 421.
Sherwood, G. E. F., 318.
Shewhart, W. A., 126, 128, 353, 443.
Shibli, J., 46.
Shields, Ellen., 108.
Shirk, J. A. G., 316.
Shirley, Elizabeth, 420.
Shively, L. S., 120, 394.
Shohat, J. A., 63, 126, 131, 226, 238, 340.
Shook, C. A., 63, 291.
Short, C. A., 63.
Shover, C. Grace, 443, 607, 613.
Shu, S. S., 372.
Shuster, C. N., 504.
Sigley, D. T., 377.
Siler, Lois, 239.
Silverstein, Irene, 421.
Simmons, H. A., 373.
Simon, W. G., 49, 383, 384.
Simon, W. N. Jr., 49.
Simons, L. G., 126, 238, 420.
Simpson, C. G., 135.
Sinclair, Mary E., 383.
Singer, R., 172.
Sinkov, A., 358.
Sisam, C. H., 387.
Sisk, A., 377.
Skarstedt, M., 318.
Skelly, J. F., 605.
Skinner, E. B., 237, 314, 443.
Skofield, L. M., 450.
Skoog, E., 108.
Slade, J. J. Jr., 483.
Slaught, H. E., 62, 111, 134, 191, 232, 394, 395, 443, 445, 446, 450, 567, 605.
Sleight, E. R., 320.
Slobin, H. L., 62, 110, 290.
Smail, L. L., 48, 63, 126, 136, 238.
Smiley, C. H., 126, 421, 443, 562.
Smith, A. H., 377.
Smith, C., 108.
Smith, C. E., 450.
Smith, Clara E., 126.
Smith, David E., 127, 135, 503.
Smith, E. L., 49.
Smith, E. R., 389, 390, 391, 445, 604.
Smith, F. C., 112.
Smith, G. W., 312, 316.
Smith, H. W., 120, 443.
Smith, Jean Esther, 421.
Smith, L. W., 399.
Smith, P. A., 311.
Smith, R. G., 316.
Smith, T. L., 50.

Smith, W. M., 63, 126, 238, 443.
Smyth, Ruth B., 383.
Snyder, V., 126, 128, 131, 132, 134, 171, 311.
Sokolnikoff, I. S., 314, 443, 567.
Solt, M. R., 110.
Sommerfeld, A., 616.
Sosnow, G. Y., 182.
South, D. E., 604.
Sparks, F. W., 372.
Sparrow, C. M., 399.
Spencer, Mary C., 504.
Spencer, Vivian E., 126, 443.
Spies, O. A., 177.
Sprague, A. H., 356.
Springer, C. E., 356.
Spunar, V. M., 299.
Stabler, E. R., 450.
Stafford, Anna A., 443, 605.
Staley, R. C., 56, 120.
Staniland, A. E., 126, 377.
Stark, Marion E., 443.
Starke, E. P., 175, 176, 178, 240, 492.
Starr, F. M., 373.
Starrett, L. G., 172.
Steed, D. V., 314.
Steen, F. H., 440.
Stelson, H. E., 383, 399.
Stephens, E., 172.
Stephens, R. C., 443.
Stephens, W. E., 172.
Stetson, J. M., 421.
Stevens, Irene, 108, 109.
Stevenson, A. F., 610.
Stevenson, G., 443.
Stokes, Ellen C., 126, 443.
Stokes, Ruth W., 188.
Stone, C. H., 1.
Stone, M. H., 39, 314, 439.
Stone, O., 250.
Stouffer, E. B., 136, 316, 443.
Stout, L. S., 240.
Stowell, C. J., 443.
Strait, L., 240.
Stratton, W. T., 316.
Strein, Clara, 490.
Strobel, C., 422.
Strom, C. W., 389.
Strong, Cora, 127.
Strong, G., 604.
Strutton, E., 293.
Struve, O., 565.
Suckau, J. W., 173.
Sullivan, Mildred M., 377, 566.
Sullivan, R., 108.
Summers, Harriet, 490.
Summers, R., 358.
Suter, Anna K., 490.
Sutton, R. M., 491, 608.
Swann, W. F. G., 238.
Swanson, A. G., 320.
Swift, E., 314, 494, 499.
Synge, J. L., 127, 202, 616.
Tacoma, T., 490.
Taisey, Emily, 557.
Tamarkin, J. D., 127.
Tarasov, L. P., 49.
Tarazi, S. R., 315.
Taylor, E., 318.
Taylor, J. H., 189, 358, 399.
Taylor, J. S., 127, 313.
Taylor, Mildred E., 120, 127, 189, 399, 443.
Teach, V. B., 443.
Teller, J. H. D., 604.
Tempest, J. A., 48.
Thébault, V., 53, 116, 561.
Theobald, J., 389, 390, 391.
Thomas, C. F., 49, 383.
Thomas, T. Y., 503.
Thompson, J. E., 297, 613.
Thompson, R. B., 315, 392, 394.
Thompson, W. R., 124.
Thomson, J. F., 124, 377.
Threlkeld, Mary A., 50.
Thuener, Sister Mary Domitilla, 377.
Thurston, H. S., 33, 179, 372, 420.
Thurstone, L. L., 606.
Timm, Irene, 174.
Titsworth, Mrs. H. L., 443.
Titt, E. W., 377, 566.
Todd, H. F., 315.
Toler, Elizabeth, 421
Tolman, R. C., 128.
Tomastic, E., 489.
Toops, H. A., 383.
Torrance, C. C., 127.
Torrance, R., 172.
Torrey, Marion M., 124, 189.
Touton, F. C., 318.
Traber, R., 107.
Tracey, J. I., 39, 127, 235.
Trask, Barbara, 295.
Trevor, J. E., 115, 580.
Tucker, A. W., 377, 440.
Tucker, C. B., 421.
Turkin, H., 605.
Turner, Bird M., 443.
Turner, Laura N., 134.
Turner, L. R., 239.
Turney, W. H., 437.
Tyler, H. W., 399.
Uhler, H. S., 297, 327.
Uicker, J. J., 109.
Underhill, A. L., 313.
Underwood, F., 59, 120, 122, 180, 307, 370, 372, 431, 434, 435, 437, 502, 564, 611.
Underwood, R. S., 222.
Urner, S. E., 318.
Uspensky, J. V., 5, 614.
Van Buskirk, H. C., 318.
Van Deusen, Dorothy, 320.
Vandiver, H. S., 135.
Van Kampen, E. R., 503.
Van Schaack, G. B., 440.
Van Velzer, H. L., 239.
Van Vleck, E. B., 443.
Vass, J. I., 567.
Vatnsdal, J. R., 358.
Vatriquant, S., 112, 176, 178, 296, 298, 362, 363, 423, 424, 425, 426, 432, 492, 493, 494, 500, 559, 560, 563, 608, 609.
Veblen, O., 62, 127, 128, 250, 439.
Veeder, H. A., 108.
Vehse, C. H., 378.
Vest, M. L., 450.
Vickery, C. W., 378.
Vinti, J. P., 378.
Virts, R. O., 394, 395.
Volkman, W. J., 109.
Voll, R., 50.
von Neumann, J., 128, 188, 315.
Wad, E., 369.
Waddell, Myra, 488.
Wade, T. L. Jr., 173, 174, 189, 315, 399.
Wagner, C. C., 239.
Wagner, E. H., 378.
Wahl, A. M., 378.
Wahlert, H. E., 315.
Wahlin, G. E., 107.
Waider, K. J., 450.
Walker, Fern, 293.
Walker, L. C., 135.
Walker, R. J., 443.
Wall, Constance, 294.
Wall, H. S., 313.
Wallace, A. M., 373.
Walrath, G., 604.
Walsh, Correa M., 39.
Walsh, J. L., 127, 131, 133, 450.
Walter, R. N., 108, 134, 297, 363, 492, 493, 494, 559, 560, 609.
Walton, T. O., 320, 321.
Wamser, C. A., 605.
Ward, Jane, 420.
Ward, L. E., 312, 389.
Ward, M., 51, 297, 340, 364, 423, 495, 614.
Ward, W., 240.
Watkins, Emily, 239.
Watkins, J. B., 605.
Watson, W., 489.
Wear, L. E., 318.
Weaver, C. L., 383, 384, 450.
Weaver, J. H., 85, 127, 135, 383, 494.
Weaver, W., 127, 310.
Webber, G. C., 606.
Weber, W. W., 504.
Wedderburn, J. H. M., 129, 439.
Wegner, U., 23.
Weick, H., 176.
Weida, F. M., 127, 135, 189, 190, 238, 399, 401.
Weisbrot, W., 240.
Weiss, Marie, J., 443.
Wells, E. D., 289.
Wells, M. E., 603.
Wendland, R., 489.
Wernicke, P., 118, 119, 120, 180, 249, 307.
Wertheimer, A., 358, 359.
West, H. A., 135.
West, J. M., 606.
Westaway, F. W., 548.
Westemeier, J. J., 389, 390.
Westerfield, E. C., 18.
Westfall, W. D. A., 107.
Weyl, H., 250.
Wheeler, A. H., 114.
Wheeler, Anna Pell, 63, 127, 135.
Wheeler, C. H., 189, 399.
Wheeler, J. J., 312, 316.
Whelan, A. Marie, 420, 450.
Whitford, A. E., 378.
Whitford, E. E., 298, 362.
Whiting, Mabel G., 318.
Whitman, E. A., 415.
Whitney, H., 378, 440.
Whitney, Mr., 357.
Whyburn, G. T., 127, 189, 399.
Whyburn, W. M., 136.
Wiarda, G., 169.
Widder, D. V., 127, 421.
Wieleitner, H., 135.
Wiener, N., 415.
Wier, R., 107.
Wiggin, Evelyn P., 399.
Wilbur, W. E., 110, 290.
Wilczewski, J., 124.
Wilder, R. L., 233, 313, 320, 439.
Wildermuth, R. B., 383.
Wiley, Ellen E., 443.
Wiley, F. B., 383.
Willard, H. R., 312.
Willett, H. C., 318.
Willey, Maud, 296, 609.
Williams, F. B., 440.
Williams, H., 174.
Williams, K. P., 394, 395.
Williams, W. L., 443.
Williamson, J., 65, 189.
Wilmer, F. L., 53, 54, 184.
Wilson, A. H., 63, 127.
Wilson, C. L., 134.
Wilson, C. R., 127, 240.
Wilson, E. B., 443.
Wilson, Elizabeth W., 127, 443.
Wilson, J. A., 606.
Wilson, T. R. C., 120, 363.
Wilson, Verna, 108.
Wilson, W. A., 127.
Winger, R. M., 110, 292, 424, 431.
Winslow, J. B., 320.
Winston, C., 63.
Wirz, Helen, 239.
Witmer, E. E., 238.
Wolf, Margarete C., 443, 450.
Wong, B. C., 488.
Woo, K., 378.
Wood, F. E., 313, 443.
Wood, Meta A., 443.
Wood, Rose B., 135.
Wood, Ruth G., 127.
Woods, F. S., 127.
Woods, L. P., 50.
Woods, R., 118, 122, 312, 389.
Woodward, Mr., 357.

Woolard, E. W., 189, 311.
Worthington, E. R., 318.
Wrage, J., 174.
Wren, F. L., 269.
Wrench, J., 422.
Wright, H. A., 315.
Wright, W. L., 63.
Wyant, Kathryn, 50.
Wylie, C. C., 312.
Wynne, Miss, 357.

Yanney, B. F., 443.
Yanosik, G. A., 51, 296, 306, 504.
Yates, R. C., 189, 559.
Yates, W. M., 172.
Yeaton, C. H., 46, 127, 136, 443.
Yoe, J. H., 1.
Young, Jessica M., 172, 173.
Young, J. W., 135.
Young, Mabel M., 196, 293.
Young, Margaret M., 182.

Yowell, E. I., 443.
Zander, L., 614.
Zant, J. H., 315.
Zariski, O., 127, 189.
Zeffren, H. E., 172.
Zeigel, Marguerite L., 124, 378.
Zelinske, Florence, 174.
Zimmerman, B. C., 112, 178, 362, 608.
Zwecher, Frieda, 489.

NECROLOGY

Andrews, Anna H., 135.
Bauer, L. A., 135.
Blair, Vevia, 504.
Börger, R. L., 250.
Brodie, W. M., 135.
Chace, A. B., 135.
Defoe, L. M., 440.
Dickinson, C. N., 135.
Donahue, J. E., 135.
Fields, J. C., 135.

Fiske, H. W., 250.
Grant, J. D., 135.
Green, R. L., 124, 135.
Jekel, A. H., 135.
Kellogg, O. D., 135.
Kryder, Lylah, 135.
Moore, E. H., 62.
Paley, R. A. E. C., 440.
Pettersen, C. A., 135.

Porter, J. G., 440.
Simpson, C. G., 135.
Stone, O., 250.
Walker, L. C., 135.
West, H. A., 135.
Wieleitner, H., 135.
Williams, F. B., 440.
Wood, Rose B., 135.
Young, J. W., 135.

CORRIGENDA

Volume XL, 1933.

P. 120, line 12, for "Bulter," read "Butler."
P. 124, line 9, for "A. L. Meder," read "A. E. Meder."
P. 174, line 3, for "W. M. Aylor," read "M. W. Aylor."
P. 178, problem E-10, the skeleton division should be as in vol. 39 (1932), p. 548.
P. 188, A correction.
P. 309, 13th line from bottom, for "American" read "America."
P. 340, A correction to vol. 40 (1933), p. 226.
P. 406, in equations (1), for "$\frac{\partial U}{\partial \xi}, \frac{\partial U}{\partial \eta}, \frac{\partial U}{\partial \zeta}$" read respectively "$\frac{\partial U}{\partial \xi_i}, \frac{\partial U}{\partial \eta_i}, \frac{\partial U}{\partial \zeta_i}$."
P. 407, line 5, in the numerator of the first fraction read "e_3" for "e_2."
P. 412, 18th line from bottom, for "4 – 224a" read "4 – 224a'."
P. 420, 5th line from bottom, for "Whalen," read "Whelan."
P. 440, A Note. An addition to a reading list in elementary theory of equations, vol. 40 (1933), pp. 77–84.
P. 445, line 15, for "Medgycy" read "Medgyesy."
P. 504, 10th line from bottom, "Columbia College, South Carolina" and "Lander College" should be interchanged.
P. 605, line 18, for "Bauer, Julia W.", read "Bower, Julia W."

THE MATHEMATICAL ASSOCIATION OF AMERICA

(INCORPORATED)

REGISTER OF OFFICERS AND MEMBERS

FOR THE ACADEMIC YEAR

1933–1934

MENASHA, WIS., AND ITHACA, N. Y.
PUBLISHED BY THE ASSOCIATION
1933

BOARD OF TRUSTEES FOR THE YEAR 1933

ARNOLD DRESDEN, Swarthmore College, *President (1933–1934)*
A. A. BENNETT, Brown University, *Vice-President*
E. B. STOUFFER, University of Kansas, *Vice-President*
W. D. CAIRNS, Oberlin College, *Secretary-Treasurer*
R. B. MCCLENON, Grinnell College, *Librarian*
C. H. YEATON, Oberlin College, *Assistant Secretary**

APPOINTED MEMBERS OF THE BOARD—*Committee on the Official Journal*

A. J. KEMPNER, University of Colorado
H. E. SLAUGHT, University of Chicago, *Manager*
W. B. CARVER, Cornell University, *Editor-in-Chief*

ELECTED MEMBERS OF THE BOARD

To serve until January 1934

L. L. DINES, Carnegie Institute of Technology
T. C. FRY, Bell Telephone Laboratories
J. W. GLOVER, University of Michigan
E. P. LANE, University of Chicago

To serve until January 1935

H. E. BUCHANAN, Tulane University
W. B. FORD, University of Michigan
E. R. HEDRICK, University of California at Los Angeles
W. R. LONGLEY, Yale University

To serve until January 1936

B. F. FINKEL, Drury College
W. L. HART, University of Minnesota
E. V. HUNTINGTON, Harvard University
E. J. MOULTON, Northwestern University

For a list of all officers and trustees for preceding years, see page 67.

STANDING COMMITTEES OF THE ASSOCIATION

COMMITTEE ON LIBRARIES

SOLOMON LEFSCHETZ, Princeton University
W. R. LONGLEY, Yale University
R. E. ROOT, U. S. Naval Academy
W. B. FORD, University of Michigan, *Chairman*

EDITORIAL COMMITTEE ON CARUS MONOGRAPHS

G. A. BLISS, University of Chicago
D. R. CURTISS, Northwestern University
A. J. KEMPNER, University of Colorado
H. E. SLAUGHT, University of Chicago

COMMITTEE ON MATHEMATICAL DICTIONARY

R. C. ARCHIBALD, Brown University
H. L. RIETZ, University of Iowa
H. E. SLAUGHT, University of Chicago
D. E. SMITH, Columbia University
E. R. HEDRICK, University of California at Los Angeles, *Chairman*

COMMITTEE ON THE ARNOLD BUFFUM CHACE PUBLICATION OF THE RHIND PAPYRUS

R. C. ARCHIBALD, Brown University
W. D. CAIRNS, Oberlin College
H. E. SLAUGHT, University of Chicago

---

* Not a member of the Board.

ON THE JOINT COMMITTEE OF THE ASSOCIATION AND THE NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS ON A ONE-YEAR COURSE IN PLANE AND SOLID GEOMETRY

DUNHAM JACKSON, University of Minnesota, *Chairman*
RALPH BEATLEY, Harvard University
J. O. HASSLER, University of Oklahoma
C. N. MOORE, University of Cincinnati
W. D. REEVE, Columbia University

REPRESENTATIVES ON COUNCILS OF SCIENTIFIC ORGANIZATIONS

National Research Council—H. L. RIETZ, University of Iowa, for the term ending June 11, 1935

American Association for the Advancement of Science—W. D. CAIRNS, Oberlin College, E. P. LANE, University of Chicago, and J. I. TRACEY, Yale University, for the year 1933

ASSOCIATE EDITORS OF THE OFFICIAL JOURNAL FOR 1933

W. F. CHENEY, Connecticut State College
N. A. COURT, University of Oklahoma
OTTO DUNKEL, Washington University
B. F. FINKEL, Drury College
R. E. GILMAN, Brown University
R. A. JOHNSON, Brooklyn College
B. W. JONES, Cornell University
J. R. MUSSELMAN, Western Reserve University
H. L. OLSON, Michigan State College
R. G. SANGER, University of Chicago
DAVID EUGENE SMITH, Columbia University
J. H. WEAVER, Ohio State University
F. M. WEIDA, George Washington University

ASSOCIATE EDITORS OF THE ANNALS OF MATHEMATICS

Representing the Association 1933

H. S. VANDIVER, University of Texas
MRS. ANNA PELL WHEELER, Bryn Mawr College

SECTIONS OF THE ASSOCIATION

ILLINOIS

W. C. KRATHWOHL, Armour Institute of Technology, *Chairman*
E. B. MILLER, Illinois College, *Vice-Chairman*
C. N. MILLS, Illinois State Normal University, *Secretary-Treasurer*
EDITH I. ATKIN, Illinois State Normal University, *Associate Secretary-Treasurer*

INDIANA

JUNA M. LUTZ, Butler University, *Chairman*
R. O. VIRTS, Fort Wayne High School, *Vice-Chairman*
P. D. EDWARDS, Ball State Teachers College, *Secretary-Treasurer*

IOWA

J. F. REILLY, University of Iowa, *Chairman*
M. E. GRABER, Morningside College, *Vice-Chairman*
CORNELIUS GOUWENS, Iowa State College, *Secretary-Treasurer*

KANSAS

R. W. BABCOCK, State Agricultural College, *Chairman*
G. W. SMITH, University of Kansas, *Vice-Chairman*
LUCY T. DOUGHERTY, Kansas City Junior College, *Secretary-Treasurer*

KENTUCKY

L. W. COHEN, University of Kentucky, *Chairman*
A. R. FEHN, Centre College, *Secretary-Treasurer*

LOUISIANA-MISSISSIPPI

P. K. SMITH, Louisiana Polytechnic Institute, *Chairman*
C. G. KILLEN, Louisiana State Normal College, *Vice-Chairman*
W. V. PARKER, Mississippi Woman's College, *Vice-Chairman*
DOROTHY MCCOY, Belhaven College, *Secretary-Treasurer*

MARYLAND-DISTRICT OF COLUMBIA-VIRGINIA

B. Z. LINFIELD, University of Virginia, *Chairman*
F. M. WEIDA, George Washington University, *Secretary-Treasurer*

ABRAHAM COHEN, Johns Hopkins University, *Member Executive Committee*
ALEXANDER DILLINGHAM, U. S. Naval Academy, *Member Executive Committee*

MICHIGAN

T. O. WALTON, Kalamazoo College, *Chairman*
W. L. AYRES, University of Michigan, *Secretary-Treasurer*
R. W. CLACK, Alma College, *Member Executive Committee*

MINNESOTA

C. S. CARLSON, St. Olaf College, *Chairman*
A. L. UNDERHILL, University of Minnesota, *Secretary-Treasurer*
H. E. HARTIG, University of Minnesota, *Member Executive Committee*
INEZ RUNDSTROM, Gustavus Adolphus College, *Member Executive Committee*

MISSOURI

NEBRASKA

J. M. EARL, University of Omaha, *Chairman*
J. M. HOWIE, Nebraska Wesleyan University, *Secretary-Treasurer*
T. A. PIERCE, University of Nebraska, *Member Executive Committee*

OHIO

I. A. BARNETT, University of Cincinnati, *Chairman*
RUFUS CRANE, Ohio Wesleyan University, *Secretary-Treasurer*
F. R. BAMFORTH, Ohio State University, *Member Executive Committee*

OKLAHOMA

N. A. COURT, University of Oklahoma, *Chairman*
A. M. WALLACE, East Central State Teachers College, *Vice-Chairman*
E. F. ALLEN, Oklahoma A. and M. College, *Secretary-Treasurer*

PHILADELPHIA SECTION

J. R. KLINE, University of Pennsylvania, *Chairman*
P. A. CARIS, University of Pennsylvania, *Secretary-Treasurer*

ROCKY MOUNTAIN SECTION

C. H. SISAM, Colorado College, *Chairman*
J. C. FITTERER, Colorado School of Mines, *Vice-Chairman*
A. J. LEWIS, University of Denver, *Secretary-Treasurer*

SOUTHEASTERN SECTION

D. F. BARROW, University of Georgia, *Chairman*
FLOYD FIELD, Georgia School of Technology, *Vice-Chairman*
H. A. ROBINSON, Agnes Scott College, *Secretary-Treasurer*

SOUTHERN CALIFORNIA SECTION

O. W. ALBERT, University of Redlands, *Chairman*
C. G. JAEGER, Pomona College, *Vice-Chairman*
P. H. DAUS, University of California at Los Angeles, *Secretary-Treasurer*

TEXAS

W. A. REES, Houston Junior College, *Chairman*
*B. P. REINSCH, Southern Methodist University, *Vice-Chairman*
NAT EDMONSON, JR., A. and M. College of Texas, *Secretary-Treasurer*

†WESTERN PENNSYLVANIA

WISCONSIN

G. A. PARKINSON, University of Wisconsin, Extension Division, *Chairman*
H. P. PETTIT, Marquette University, *Secretary-Treasurer*

---

* Left the state.

† A section for the Pittsburgh region is being organized with C. S. ATCHISON, Washington and Jefferson College, as *Chairman*, and J. S. TAYLOR, University of Pittsburgh, as *Secretary-Treasurer.*

INDIVIDUAL MEMBERS OF THE MATHEMATICAL ASSOCIATION OF AMERICA

Closed for printing November 24, 1933

NOTE. This list gives data for the members of the Association as taken from the Register issued in November 1931, unless changes in position, mailing address, etc., have been reported to the Secretary. Records may be inexact or incomplete through the failure of members to return fresh information to the Secretary, but great effort has been put forth to be full and correct. When members are known to be occupied in other lines than mathematics, this fact is indicated.

ABERLE, F. J., B.S. (Carnegie Inst. of Tech.) 637 Elm St., Bridgeville, Pa.
ACKLEY, Prof. H. M., A.M. (Olivet) Western State Teachers Coll., Kalamazoo, Mich. *602 Axtell St.*
ADAMS, B. T., A.M. (Baylor) Head of Dept., Jr. Coll., Wichita Falls, Tex.
ADAMS, Asso. Prof. C. R., Ph.D. (Harvard) Brown Univ., Providence, R.I. *260 Doyle Ave.*
ADAMS, Prof. E. P., Ph.D. (Harvard) Physics, Princeton Univ., Princeton, N.J.
ADAMS, Helen S. (Mrs. L. P.), Ph.D. (Cornell) Instr., Hunter Coll., New York, N.Y. *219 Division Ave., Hasbrouck Hts., N.J.*
ADAMS, O S., D.Sc. (Kenyon) Senior Mathematician, U.S. Coast and Geodetic Survey, Washington, D.C.
ADKINS, J. B., Ph.B. (Chicago) Teacher, Moses Brown School, Providence, R.I.
ADKISSON, Asst. Prof. V. W., Ph.D. (Pennsylvania) Univ. of Arkansas, Fayetteville, Ark. *505 Storer St.*
AGARD, Prof. H. L., Ph.D. (Yale) Dean, Williams Coll., Williamstown, Mass.
AGNEW, Asst. Prof. R. P., Ph.D. (Cornell) Cornell Univ., Ithaca, N. Y. *8 White Hall.*
AITCHISON, BEATRICE, A.M. (Johns Hopkins) 1929 S Street, Washington, D. C.
AKERS, Prof. O. P., Ph.D. (Cornell) Allegheny Coll., Meadville, Pa. *360 N. Main St.*
ALBERT, Prof. O. W., Ph.D. (Washington) Univ. of Redlands, Redlands, Calif. *629 Buena Vista St.*
ALDERTON, Asso. Prof. Nina M., Ph.D. (California) Mills Coll., Mills College, Calif. *1918 Lakeshore Ave., Oakland, Calif.*
ALEXANDER, Prof. J. W., Ph.D. (Princeton) Princeton Univ., Princeton, N. J. *29 Cleveland Lane*
ALICE IRENE, Sister, A.M. (Columbia Coll. of St. Catherine) Instr., Columbia Coll. of St. Catherine, St. Paul, Minn.
ALICE IRENE, Sister, A.M. (St. Canisius) Prof., Coll. of St. Rose, Albany, N. Y. *979 Madison Ave.*
ALLEN, Asso. Prof. BERD R., M.S. (Chicago) Judson Coll., Marion, Ala.
ALLEN, Prof. E. E., A.M. (Park Coll.) Occidental Coll., Los Angeles, Calif.
ALLEN, Asso. Prof. E. F., Ph.D. (Missouri) Oklahoma A. and M. Coll., Stillwater, Okla. *519 Lincoln St.*
ALLEN, FLORENCE E., Ph.D. (Wisconsin) Inst., Univ. of Wisconsin, Madison, Wis. *219 Lathrop St.*
ALLEN, Asso. Prof. JOSEPH, A.M. (Harvard) Coll. of the City of New York, New York, N. Y.
ALLEN, Prof. R. B., Ph.D. (Clark) Kenyon Coll., Gambier, Ohio
ALLIOT, Prof. EUGENE, Lic. es Sc. (Paris) St. Michael's Coll., Winooski, Vt.
ALLISON, ELI, M.S. (Wesleyan) Head of Dept., Franklin School, New York, N. Y. *894 Riverside Drive*
ALLISON, N. B., A.M. (Kentucky) Instr., Univ. of Kentucky, Lexington, Ky. *Dept. of Math.*
ALRICH, G. F., M.S (Lehigh) Instr., Univ. of Maryland, College Park, Md.
AMES, Prof. L. D., Ph.D. (Harvard) Univ. of Southern California, Los Angeles, Calif.
AMICK, T. C., A.M. (North Carolina) Elon College, N. C.
AMOS, Prof. C. E., Ph.D. (Ohio State) Whitworth Coll., Spokane, Wash.
ANDERSEN, Prof. A. E., A.M. (Nebraska) Wagner Coll., Staten Island, N. Y. *5 Wagner College Road*
ANDERSON, H. E., A.M. (Augustana) Teacher, High School, Atascadero, Calif.
ANDERSON, Prof. MARY, A.M. (Illinois) Illinois Woman's Coll., Jacksonville, Ill.
ANDERSON, Asso. Prof. NOLA L., Ph.D. (Missouri) Chm., Dept. of Math., Sophie Newcomb Coll., New Orleans, La.
ANDERSON, R. LUCILLE, Ph.D. (Bryn Mawr) Instr., Hunter Coll., New York, N. Y. *Dept. of Math.*
ANDERSON, Prof. W. E., Ph.D. (Pennsylvania) Miami Univ., Oxford, Ohio

ANDERTON, ETHEL, L.Ph.D. (Yale) Teacher, High School, West Haven, Conn. *22 Chestnut St.*

ANDREW, THURMAN, M.S. (Kentucky) Instr., Wentworth Inst., Boston, Mass. *133 Utica St., Quincy, Mass.*

ANSELM, Brother, A.B. (Mt. St. Joseph's Coll.) Address unknown.

ARCHER, Prof. PETER. Canisius High School, Buffalo, N. Y. *651 Washington St.*

ARCHIBALD, Prof. R. C , Ph D. (Strasbourg), Dr. (Univ. Padua), LL.D. (Mt. Allison) Brown Univ., Providence, R. I.

ARCHIBALD, Asst. Prof. R. G., Ph.D. (Chicago) Columbia Univ., New York, N. Y. *Hamilton Hall.*

ARMSTRONG, BEULAH M., Ph.D. (Illinois) Asso., Univ. of Illinois, Urbana, Ill. *364 Math. Bldg.*

ARNAUD, J. J., B.S. (Coll. City of N. Y.) Asst. Astronomer, U. S. Naval Observatory, Washington, D. C. *2520 Hall Pl. N. W.*

ARNDT, Prof. W. F. C., Ph.D. (Göttingen) Grey Univ. Coll., Univ. of S. Africa, Bloemfontein, S. Africa.

ARNOLD, Asst. Prof. H. E., Ph.D. (Yale) Wesleyan Univ., Middletown, Conn. *19 Laurel St.*

ARNOLD, Dean KATHERINE S., A.M. (Columbia) Tennent Coll., Philadelphia, Pa. *1122 Spruce St.*

ARNOLD, Asst. Prof. W. C., M.S., A.M. (Chicago) DePauw Univ., Greencastle, Ind. *Box 466*

ASHBAUGH, LAURA F. (Mrs. F. R.), A.B. (Pennsylvania) 924 W. Market St., Bethlehem, Pa.

ASHCRAFT, Prof. T. B., Ph.D. (Johns Hopkins) Colby Coll., Waterville, Me. *34 Pleasant St.*

ASHMUN, R. N., A.M. (Washington) Mathematician, Internat. Boundary Commission, Washington, D. C. *1524 Newton St. N.E.*

ASHTON, Prof. C. H., Ph.D. (Munich) Univ. of Kansas, Lawrence, Kans. *1200 Ohio St.*

ASTRACHAN, MAX, A.M. (Brown) Instr., Brown Univ., Providence, R. I.

ATCHISON, Prof. C. S., Ph.D. (Johns Hopkins) Washington and Jefferson Coll., Washington, Pa. *442 E. Beau St.*

ATKIN, Asst. Prof. EDITH I., A.M. (Columbia) Illinois State Normal Univ., Normal, Ill. *815 S. Fell Ave.*

AUDE, Prof. H. T. R., M.S. (Colgate) Colgate Univ., Hamilton, N. Y. *50 Broad St.*

AURELIUS, Brother, A.M. (Catholic Univ. of Amer.) Teacher, Keith Acad., Lowell, Mass.

AVERS, H. G., A.B. (George Washington) Chief Mathematician, Div. of Geodesy, U. S. Coast and Geodetic Survey, Washington, D. C.

AYLOR, M. W., M.S. (Virginia) Instr., Univ. of Virginia, University, Va. *33 University Circle*

AYRES, FRANK, Jr., M.S. (Chicago) Instr., Dickinson Coll., Carlisle, Pa. *426 S. Pitt St.*

AYRES, Asso. Prof. W. L., Ph.D. (Pennsylvania) Univ. of Michigan, Ann Arbor, Mich. *1204 Henry St.*

BABBITT, A. E., A.M. (Illinois) Secretary and Actuary, Lamar Life Ins. Co., Jackson, Mich.

BABCOCK, Dean R. W., Ph.D. (Wisconsin) Div. of General Sc., State Agric. Coll., Manhattan, Kans.

BABCOCK, Asst. Prof. WEALTHY, Ph.D. (Kansas) Univ. of Kansas, Lawrence, Kans. *1300 Louisiana St.*

BACON, Prof. CLARA L., Ph.D. (Johns Hopkins) Goucher Coll., Baltimore, Md. *2316 N. Calvert St.*

BAGBY, Prof. L. C., A.M. (Kansas) Linsly Inst. of Tech., Wheeling, W. Va. *33 Maple Ave.*

BAIDAFF, B. I., Dr. (Buenos Aires) Analisis, Univ. Nac., Buenos Aires, Argentina. *Belgrano 909*

BAILEY, A. H., A.M. (Haverford) Grad. Asst., Ohio State Univ., Columbus, Ohio. *Wilmington, Ohio*

BAILEY, Prof. F. H., A.M. (Harvard) Massachusetts Inst. of Tech., Cambridge, Mass.

BAILEY, Asst. Prof. H. W., Ph.D. (Illinois) Univ. of Illinois, Urbana, Ill. *253 Math. Bldg.*

BAIRD, A. C., A.B. (Wooster) Vice-Prin., Allderdice High School, Pittsburgh, Pa. *Seven Mile, Ohio*

BAKER, FRANCES E., M.S. (Iowa) 829 Kirkwood Ave., Iowa City, Iowa

BAKER, G. A., Ph.D. (Illinois) Head of Dept., Shurtleff Coll., Alton, Ill. *3016 Edwards St.*

BAKER, Asso. Prof. IDA M., A.M. (Columbia) School of Educ., Western Reserve Univ., Cleveland, Ohio

BAKER, Prof. R. P., Ph.D. (Chicago) Univ. of Iowa, Iowa City, Iowa. *829 Kirkwood Ave.*

BAKER, S. R., A.B. (Ursinus) Nat. Cash Register Co., York, Pa. *535 W. Princess St.*

BALDWIN, Asso. Prof. J. W., A.M. (Michigan) Registrar, Coll. of the City of Detroit, Detroit, Mich. *6433 Roosevelt Ave.*

BALL, N. H., Ph.D. (Mass. Inst. of Tech.) Princeton Univ., Princeton, N. J. *103 N. Moore St.*

BALLANTINE, Asso. Prof. J. P., Ph.D. (Chicago) Univ. of Washington, Seattle, Wash. *1802 Ravenna Blvd.*

BALOF, C. A., M.S. (Iowa) Instr., Lincoln Coll., Lincoln, Ill. *712 N. Hamilton St.*

BAMFORTH, Asst. Prof. F. R., Ph.D. (Queen's) Ohio State Univ., Columbus, Ohio. *290 East 15th Ave.*

BANES, Asst. Prof. GLADYS L., Ed.M. (Harvard), A.M. (Radcliffe) Butler Univ., Indianapolis, Ind. *1556 Brookside Ave.*

BANKS, Prof. N. A., M.S. (Wilberforce) Tillotson Coll., Austin, Tex. *Box 441.*

BARBER, H. C., A.M. (Amherst) Teacher, English High School, Boston, Mass. *22 Garden St.*

BARBOUR, Asst. Prof. J. M., Ph.D. (Cornell) Music, Ithaca Coll., Ithaca, N. Y. *416 W. Seneca St.*

BAREIS, Asst. Prof. GRACE M., Ph.D. (Ohio State) Ohio State Univ., Columbus, Ohio. *Canal Winchester, Ohio*

BARNARD, Asso. Prof. R. W., Ph.D. (Chicago) Univ. of Chicago, Chicago, Ill. *Box 35, Eckhart Hall*

BARNETT, Asso. Prof. I. A., Ph.D. (Chicago) Univ. of Cincinnati, Cincinnati, Ohio. *Dept. of Math.*

BARNETT, Asst. Prof JOSEPH, JR., A.M. (Columbia) Oklahoma A. and M. Coll., Stillwater, Okla. *226 West St.*

BARNEY, IDA, Ph.D. (Yale) Research Asst., Yale Univ. Observatory, New Haven, Conn. *110 Linden St.*

BARNHILL, Prof. J. F., A.M. (Columbia) Michigan State Normal Coll., Ypsilanti, Mich.

BARR, Asst. Prof. C. F., M.S. (Chicago) Univ. of Wyoming, Laramie, Wyo. *563 N. 8th St.*

BARROW, Prof. D. F., Ph.D. (Harvard) Univ. of Georgia, Athens, Ga. *260 Cherokee Ave.*

BARTKY, Asst. Prof. WALTER, Ph.D. (Chicago) Mathl. Astr., Univ. of Chicago, Chicago, Ill.

BARTON, Prof. HELEN, Ph.D. (Johns Hopkins) Head of Dept., Woman's Coll., Univ. of North Carolina, Greensboro, N. C.

BASOCO, Asso. Prof. M.A., Ph.D. (Calif. Inst. of Tech.) Univ. of Nebraska, Lincoln, Nebr. *Dept. of Math.*

BASSLER, KATHERINE R., A.M. (Bryn Mawr) Teacher, Bryn Mawr School for Girls, Baltimore, Md. *1015 N. Charles St.*

BATCHELDER, Asso. Prof. P. M., Ph.D. (Harvard) Pure Math., Univ. of Texas, Austin, Tex. *808 W. 22nd St.*

BATEMAN, Prof. HARRY, Ph.D. (Johns Hopkins) Math., Theoret. Physics and Aeronautics, California Inst. of Tech., Pasadena, Calif.

BATEN, Asst. Prof. W. D., Ph.D. (Michigan) Univ. of Michigan, Ann Arbor, Mich. *210 Buena Vista Ave.*

BATTIG, LEON, A. M. (Wisconsin) Instr., Extension Div., Univ. of Wisconsin, Milwaukee, Wis. *2542 N. Buffum St.*

BAUER, Prof. G. N., Ph.D. (Columbia) Statistics, Univ. of New Hampshire, Durham, N. H.

BAUER, L. M., A.M. (New Mexico) Teacher, Menaul School, Albuquerque, N. Mex.

BAUR, Asso. Prof. P. E., M.S. (Michigan) Math. and Drawing, Baldwin-Wallace Coll., Berea, Ohio. *114 E. Grand St.*

BAY, J. C. Librarian, The John Crerar Library, Chicago, Ill. *86 E. Randolph St.*

BAYS, Dr. SÉVÉRIN. Prof. ord. math. pures, Univ. de Fribourg, Fribourg, Switzerland.

BEAR, A. W., B.S. (Marquette) Instr., Marquette Univ., Milwaukee, Wis. *2016 W. Scott St.*

BEATLEY, Asso. Prof. RALPH, A.M. (Columbia) Harvard Grad. School of Educ., Cambridge, Mass.

BEATTY, Asst. Prof. H. M., A.M. (Ohio State) Ohio State Univ., Columbus, Ohio. *200 Tibet Road*

BEATTY, Prof. SAMUEL, Ph.D. (Toronto) Univ. of Toronto, Toronto, Ont., Can.

BEATY, Asso. Prof. E. B., A.M. (California) Oregon Agric Coll., Corvallis, Ore. *21 N. 27th St.*

BEAVER, Asst. Prof. R. A., Ph.D. (Cornell) State Coll. for Teachers, Albany, N.Y.

BECKWITH, Prof. ETHELWYNN R. (Mrs. W. E.), Ph.D. (Radcliffe) Head of Dept., Milwaukee-Downer Coll., Milwaukee, Wis.

BEENKEN, MAY M., Ph.D. (Chicago) Head of Dept., State Teachers Coll., Oshkosh, Wis.

BEETLE, Prof. R. D., Ph.D. (Princeton) Dartmouth Coll., Hanover, N. H.

BEISEL, Asst. Prof. B. R., B.S. (Allegheny) Allegheny Coll., Meadville, Pa. *345 Highland Ave.*

BELL, Asst. Prof. CLIFFORD, Ph.D. (California) Univ. of California at Los Angeles, Los Angeles, Calif.

BELL, Prof. E. T., Ph.D. (Columbia) California Inst. of Tech., Pasadena, Calif.

BELL, LOIS E., A.M. (Kansas) Instr., Independence Jr. Coll., Independence, Kans. *409 N. Ninth St.*

BELL, R. F., A.B. (New River State Coll.) Teacher, High School, Montgomery, West Va. *Smithers, West Va.*

BELLAMY, B. C., B.S.C.E. (Wyoming) Civil Engineer, Laramie, Wyo.

BENANDER, C. A., A.B. (Harvard) Ovington, Wash.

BENDER, Asst. Prof. H. A., Ph.D. (Illinois) Univ. of Akron, Akron, Ohio

BENEDICT, Pres. H. Y., Ph.D. (Harvard) Univ. of Texas, Austin, Tex.

BENEDICT, Prof. SUZAN R., Ph.D. (Michigan) Smith Coll., Northampton, Mass. *12 Barrett Pl.*

BENEDICTA, Sister M. (BOYLE), M.S. (St. Bonaventure) Prof., Villa Maria Coll., Erie, Pa. *W. 8th St.*

BENNETT, Prof. A. A., Ph.D. (Princeton) Brown Univ., Providence, R. I.

BENNETT, Prof. J. L., A.M. (Kansas) Physics, Ottawa Univ., Ottawa, Kans.

BENNETT, Asst. Prof. THEODORE, Ph.D. (Illinois) Univ. of Wisconsin, Madison, Wis.

BERGER, EDLA G., A.M. (Minnesota) Mathematician, Actuarial Dept., Equitable Life Assur. Soc., New York, N. Y. *1411-161st St., Queens, New York, N. Y.*

BERGSTRESSER, C. A., A.M. (Lafayette), M.S. (Pennsylvania) Head of Dept., Jamaica High School, New York, N. Y. *780 St. Marks Ave., Brooklyn, N. Y.*

BERKELEY, L. M., A.M. (Virginia) 36 W. 91st St., New York, N. Y.

BERNSTEIN, Prof. B. A., Ph.D. (California) Univ. of California, Berkeley, Calif. *2785 Shasta Rd.*

BERRY, Prof. E. M., Ph.D. (Iowa) Lynchburg Coll., Lynchburg, Va. *315 Madison St.*

BERRY, Asso. Prof. GRACE E., A.M. (Mount Holyoke) Pomona Coll., Claremont, Calif. *353 W. 11th St.*

BERRY, Prof. W. J., A.M. (Harvard) Head of Dept., Poly. Inst. of Brooklyn, N. Y. *224 St. John's Pl.*

BERRY, W. J., M.S. (Colorado) Metropolitan Life Ins. Co., New York, N.Y. *609 W. 137 St.*

BERT, Prof. O. F. H., A.M. (Geneva) Washington and Jefferson Coll., Washington, Pa. *28 No. Lincoln St.*

BERTRAND, Sister M. (WALTON), Ph.D. (Fordham) Teacher, Marywood Coll., Scranton, Pa.

BETTINGER, Asst. Prof. A. K., A.M. (Wisconsin) Creighton Univ., Omaha, Nebr.

BETZ, WILLIAM, A.M. (Rochester) Specialist in math., public schools; lecturer in educ., Univ. of Rochester, Rochester, N. Y. *652 Melville St.*

BEVERIDGE, Prof. H. R., Ph.D. (Illinois) Monmouth Coll., Monmouth, Ill. *800 E. Second St.*

BIBB, Asst. Prof. S. F., M.S. (Chicago) Armour Inst. of Tech., Chicago, Ill.

BICKERSTAFF, Asst. Prof. T. A., A.M. (Mississippi) Univ. of Mississippi, University, Miss. *Box 23.*

BIGBEE, J. A., B.S. (Drury) High School, Little Rock, Ark. *3110 Battery St.*

BINGLEY, Prof. G. A., A.M. (Princeton) St. John's Coll., Annapolis, Md. *Brice House*

BIRCHBY, Asst. Prof. W. N., A.M. (Colorado Coll.) California Inst. of Tech., Pasadena, Calif.

BIRCHENOUGH, Prof. HARRY, A.M. (Columbia) State Coll. for Teachers, Albany, N. Y. *687 Hudson Ave.*

BIRKHOFF, Prof. G. D., Ph.D. (Chicago) Perkins Prof. of Math., Harvard Univ., Cambridge, Mass. *984 Memorial Drive*

BLACK, Asst. Prof. FLORENCE L., Ph.D. (Kansas) Univ. of Kansas, Lawrence, Kans. *1300 Louisiana St.*

BLACK, L. G., A.M. (Colorado) Instr., Purdue Univ., W. LaFayette, Ind. *202 North St.*

BLACK, Prof. L. T., A.M. (Michigan) Ashland Coll., Ashland, Ohio

BLACKALL, C. J., M.S. (Notre Dame) Instr., Math. and Physics, Coll. of St. Thomas, St. Paul, Minn.

BLAIR, Prof. HAROLD, A.M. (Michigan) Western State Teachers Coll., Kalamazoo, Mich. *1220 Academy St.*

BLAIR, Asso. Prof. LEORA, A.M. (Chicago) State Normal Coll., Natchitoches, La.

BLAIR, Asst. Prof. R. V., A.M. (Peabody) Vanderbilt Univ., Nashville, Tenn.

BLAKE, ARCHIE, M.S. (Chicago) Mathematician, U. S. Coast and Geodetic Survey, Washington, D. C. *1432 Girard St. N.W.*

BLAU, L. W., Ph.D. (Texas) Director of Geophysical Research, Humble Oil and Refining Co., Houston, Tex. *2027 Colquitt Ave.*

BLICHFELDT, Prof. H. F., Ph.D. (Leipzig) Stanford Univ., Stanford University, Calif. *Box 875*

BLINCOE, J. W., A.M. (Virginia) Instr., Univ. of Virginia, University, Va. *Burnley Ave.*

BLISS, Prof. G. A., Ph.D. (Chicago) Univ. of Chicago, Chicago, Ill.

BLUE, Prof. A. H., Ph.D. (Iowa) Western Union Coll., LeMars, Iowa

BLUMBERG, A. A., A.B. (Texas) Instr., A. and M. Coll., College Station, Tex. *Box 149, Faculty Exchange*

BLUMBERG, Prof. HENRY, Ph.D. (Göttingen) Ohio State Univ., Columbus, Ohio. *76 E. Blake Ave.*

BLUMENTHAL, L. M., Ph.D. (Johns Hopkins) National Research Fellow, Inst. for Advanced Study, Princeton, N. J. *Fine Hall*

BOEDER, Prof. PAUL, Ph.D. (Göttingen) Susquehanna Univ., Selinsgrove, Pa.

BOLKS, STANLEY, M.S. (Iowa State Coll.) Instr., Purdue Univ., W. LaFayette, Ind. *153 S. Sheetz St.*

BOLTON, R. W., E.E. (Illinois) 1327 E. Broadway, Glendale, Calif.

BOND, Prof. J. D., Ph.D. (Michigan) Univ. of Tennessee, Knoxville, Tenn.

BOND, Prof. O. J., LL.D. (South Carolina) The Citadel, The Milit. Coll. of South Carolina, Charleston, S. C.

BOND, W. M., A.M. (Columbia) Grad. Student, Univ. of Pennsylvania, Philadelphia, Pa. *Spruce Hotel, 13th and Spruce Sts.*

BOND, W. V. Student, Univ. of Göttingen, Göttingen, Germany. *Riemannstr. 19*

BOOTHROYD, Prof. S. L., M.S. (Colo. State Coll.) Astr., Cornell Univ., Ithaca, N. Y.

BORTOLOTTI, Prof. ETTORE, Dottore in mat. (Bologna) Univ. of Bologna, Bologna, Italy. *Via Palagi 5*

BOWDEN, Prof. JOSEPH, Ph.D. (Yale) Adelphi Coll., Garden City, N. Y. *33 Exeter St., Brooklyn, N. Y.*

BOWER, JULIA W., Ph.D. (Chicago) Instr., Connecticut Coll., New London, Conn. *115 Mohegan Ave.*

BOWER, O. K., Ph.D. (Illinois) Instr., Univ. of Illinois, Urbana, Ill. *1022 W. Daniel St.*

BOWLES, Asst. Prof. C. F., Ph.D. (Chicago) State School of Mines, Rapid City, S. Dak. *Box 922*

BOYCE, Asst. Prof. FANNIE W., A.M. (Wisconsin) Wheaton Coll., Wheaton, Ill. *On leave 1933–34, Grad. Student, Univ. of Chicago, Chicago, Ill. 5701 Kenwood Ave.*

BOYCE, JESSIE W., A.M. (Minnesota) Head of Dept., State Teachers Coll., Wayne, Nebr.

BOYCE, M. G., Ph.D. (Chicago) Instr., Adelbert Coll., Western Reserve Univ., Cleveland, Ohio

BOYD, Dean P. P., Ph.D. (Cornell) Head of Dept., Math. and Astr., Univ. of Kentucky, Lexington, Ky. *119 Waller Ave.*

BRADLEY, A. D., Ph.D. (Columbia) Instr., Hunter Coll., New York, N. Y. *8 S. Broadway, Dobbs Ferry, N. Y.*

BRADLEY, Asso. Prof. H. C., B.S. (Mass. Inst. of Tech.) Massachusetts Inst. of Tech., Cambridge, Mass.

BRADSHAW, Prof. J. W., Ph.D. (Strassburg) Univ. of Michigan, Ann Arbor, Mich. *1304 Cambridge Rd.*

BRAMBLE, Prof. C. C., Ph.D. (Johns Hopkins) Math. and Mech., Postgraduate School, U. S. Naval Acad., Annapolis, Md. *3 Fifth St.*

BRAND, Prof. LOUIS, Ph.D. (Harvard) Univ. of Cincinnati, Cincinnati, Ohio. *2605 University Ct.*

BRANDEBERRY, Prof. J. B., Ph.D. (Michigan) Univ. of Toledo, Toledo, Ohio

BRANDNER, F. A., A.M. (Chicago) Instr., Iowa State Coll., Ames, Iowa. *Dept. of Math.*

BRATTON, Prof. W. A., Sc.D. (Williams) Dean and Prof., Whitman Coll., Walla Walla, Wash. *570 Boyer Ave.*

BRAUN, ANTHONY, A.M. (Catholic Univ.) Quincy Coll., Quincy, Ill.

BRAY, Asst. Prof. H. E., Ph.D. (Rice) Rice Institute, Houston, Tex.

BRECKENRIDGE, W. E., A.M. (Yale) Head of Dept., Stuyvesant High School, New York, N. Y. *345 E. 15th St.*

BRENKE, Prof. W. C., Ph.D. (Harvard) Univ. of Nebraska, Lincoln, Nebr. *1250 S. 21st St.*

BREWSTER, Asst. Prof. J. A., A.B. (Harvard) Coll. of the City of New York, New York, N. Y. *Hudson View Gardens, 183 and Pinehurst Ave.*

BRICK, B. R., B.S. (Minnesota) Instr., Washington Univ., St. Louis, Mo. *Box 70, Washington Univ.*

BRINK, Prof. R. W., Ph.D. (Harvard) Univ. of Minnesota, Minneapolis, Minn. *55 Williams Ave. S.E.*

BRINKMANN, Asso. Prof. H. W., Ph.D. (Harvard) Swarthmore Coll., Swarthmore, Pa. *405 Walnut Lane*

BRITTON, JACK, A.B. (Clark) Instr., Engg. Math., Univ. of Colorado, Boulder, Colo. *1065 Ninth St.*

BRIXEY, Asst. Prof. J. C., A.M. (Oklahoma) Univ. of Oklahoma, Norman, Okla. *430 Park Drive*

BROCKETT, GERTRUDE L., A.M. (Brown) 74 La Salle Ave., Kenmore, N. Y.

BROOKE, Prof. W. E., A.M. (Nebraska) Math. and Mech., Univ. of Minnesota, Minneapolis, Minn.

BROWN, A. B., Ph.D. (Harvard) Instr., Columbia Univ., New York, N. Y. *215 Hamilton Hall*

BROWN, Prof. B. H., Ph.D. (Harvard) Dartmouth Coll., Hanover, N. H. *7 Ripley Rd.*

BROWN, D. M., A.B. (Illinois) Asst., Univ. of Illinois, Urbana, Ill. *160 Math. Bldg.*

BROWN, E. C., A.M. (Maine) Instr., Worcester Poly. Inst., Worcester, Mass. *47 Wachusett St.*

BROWN, Prof. E. W., D.Sc. (Cambridge, Eng.) Emeritus, Yale Univ., New Haven, Conn. *116 Everitt St.*

BROWN, Prof. H. S., M.S. (Lafayette) Hamilton Coll., Clinton, N. Y.

BROWN, Prof. LILLIAN O., A.M. (Columbia) Hood Coll., Frederick, Md.

BROWN, Prof. MYRTLE C., A.M. (Texas) Teachers Coll., Denton, Tex. *1415 W. Oak St.*

BROWN, N. C., M.S. (Maine) Teacher, Columbia High School, Maplewood, N. J. *1069 Kensington Terrace, Union, N. J.*

BROWN, Asst. Prof. O. E., Ph.D. (Iowa) Case School of Appl. Sci., Cleveland, Ohio. *13304 Forest Hill Ave., East Cleveland, Ohio*

BROWN, Prof. T. H., Ph.D. (Yale) Business Statistics, Grad School of Bus. Admin., Harvard Univ., Cambridge, Mass. *25 Meadow Way*

BROWNE, Prof. E. T., Ph.D. (Chicago) Univ. of North Carolina, Chapel Hill, N. C. *730 E. Franklin St.*

BRUCE, Prof. R. E., Ph.D. (Boston Univ.) Boston Univ., Boston, Mass.

BRYAN, Asso. Prof. N. R., Ph.D. (Columbia) Univ. of Maine, Orono, Me. *4 University Pl.*

BUCHANAN, ANN S., A.M. (Louisiana State) Instr., Southwestern Louisiana Inst., Lafayette, La. *Box 566*

BUCHANAN, Prof. DANIEL, Ph.D. (Chicago) Dean of Faculty of Arts and Sciences, Univ. of British Columbia, Vancouver, B. C , Canada

BUCHANAN, Prof. H. E., Ph.D. (Chicago) Tulane Univ., New Orleans, La.

BUCHANAN, Prof. SCOTT, Ph.D. (Harvard) Philosophy, Univ. of Virginia, University, Va.

BUCKMAN, A. L., A.M. (California) Instr., Jr. Coll., Long Beach, Calif. *4226 S. Figueroa St., Los Angeles, Calif.*

BUELL, C. E., A.M. (Ohio State) Grad. Student, Washington Univ., St. Louis, Mo. *3536 Sidney St.*

BUKER, W. E., A.M. (Ohio State) Prin. High School, Leetsdale, Pa. *Box 66*

BULLARD, Prof. J. A., Ph.D. (Clark) Math. and Mech., Univ. of Vermont, Burlington, Vt. *110 Summit St.*

BULLITT, W. M., B.S. (Princeton) 1706–1727 Inter Southern Bldg., Louisville, Ky.

BUMER, Asst. Prof. C. T., Ph.D. (Ohio State) Kenyon Coll., Gambier, Ohio

BUNYAN, Asst. Prof. L. H., Ph.D. (Wisconsin) Rutgers Univ., New Brunswick, N. J. *Dept. of Math.*

BURDICK, O.Z., M.S. (Illinois) Engineer, Chas. W. Hills, Patent Lawyers, Chicago, Ill. *1414 Monadnock Block, 53 W. Jackson Blvd.*

BURGESS, H. T., Ph.D. (Yale) Morningside Drive, Morningside, Milford, Conn.

BURGESS, R.W., Ph.D. (Cornell) Chief Statistician, Western Elec. Co., New York, N. Y. *195 Broadway*

BURINGTON, Asst. Prof. R. S., Ph.D. (Ohio State) Case School of Appl. Sc., Cleveland, Ohio. *3417 Beechwood Ave., Cleveland Heights, Ohio*

BURKE, J. G., A.M. (Mt. St. Mary's) Vice-Pres., Mt. St. Mary's Coll., Emmitsburg, Md.

BURKE, Sister LEONARDA, Ph.D. (Catholic Univ.) Prof., Regis Coll., Weston, Mass.

BURNAM, Prof. J. E., A.M. (Texas) Simmons Univ., Abilene, Tex.

BURROWS, W. R., B.S. (Chicago) Draftsman, Standard Oil Co. (Ind.) Whiting, Ind.

BURWELL, W. R., Ph.D. (Oxford, Eng.) 1720 Union Trust Bldg., Cleveland, Ohio

BUSH, Prof. L. E., Ph.D. (Ohio State) Coll. of St. Thomas, St. Paul, Minn.

BUSHEY, Asst. Prof. J. H., Ph.D. (Michigan) Hunter Coll., New York, N. Y. *Park Ave. and 68th St.*

BUSSEY, Asst. Dean and Prof. W. H., Ph.D. (Chicago) Univ. of Minnesota, Minneapolis, Minn. *106 Folwell Hall*

BUTCHART, J. H., Ph.D. (Illinois) Instr., Butler Univ., Indianapolis, Ind. *3745 Blvd. Place*

BUTLER, J. F., A.M. (St. Louis Univ.) St. Ignatius Coll., Chicago, Ill. *1076 W. Roosevelt Rd.*

BUTLER, L. G., A.M. (Oregon) Instr., State Coll. of Washington, Pullman, Wash. *1407 Bryant St.*

BUTTERFIELD, Prof. A. D., A.M. (Columbia) Coll. of Eng., Univ. of Vermont, Burlington, Vt. *25 Colchester Ave.*
BUTTERFIELD, D. D., A.M. (Princeton) Instr., Phillips Exeter Acad., Exeter, N. H. *Webster Hall*
BYRD, SAM, A.M. (Arkansas) Teacher, Central High School, Tulsa, Okla. *1344 S. Birmingham Ave.*
BYRNE, Asso. Prof. W. E., Ph.D. (Rensselaer) Virginia Milit. Inst., Lexington, Va.
BYRNES, T. J., B.S. (St. Bonaventure) Teacher, Edison Tech. High School, Rochester, N. Y. *75 Martin St.*

CAIRNS, S. S., Ph.D. (Harvard) Instr., Lehigh Univ., Bethlehem, Pa. *1217 Monocacy St.*
CAIRNS, Prof. W. D., Ph.D. (Göttingen) Oberlin Coll., Oberlin, Ohio. *33 Peters Hall*
CALKINS, EMILY E., A.B. (Columbia) Instr., Coll. of William and Mary, Williamsburg, Va. *224 Jamestown Road*
CALKINS, Prof. HELEN, Ph.D. (Cornell) Head of Dept., Pennsylvania Coll. for Women, Pittsburgh, Pa.
CALLAWAY, Asst. Prof. IRIS, A.M. (Peabody) Univ. of Georgia, Athens, Ga. *1280 Prince Ave.*
CALLAWAY, Prof. THEODOSIA T., B.S. (Columbia) Stephens Coll., Columbia, Mo. *1515 Ross St.*
CAMERON, R. H., Ph.D. (Cornell) National Research Fellow, Brown Univ., Providence, R. I. *149 Prospect St.*
CAMP, Prof. B. H., Ph.D. (Yale) Wesleyan Univ., Middletown, Conn. *110 Mt. Vernon St.*
CAMP, Prof. C. C., Ph.D. (Cornell) Univ. of Nebraska, Lincoln, Nebr. *Dept. of Math.*
CAMPBELL, Prof. A. D., Ph.D. (Cornell) Syracuse Univ., Syracuse, N. Y. *208 Westminster Ave.*
CAMPBELL, D. F., Ph.D. (Harvard) Consulting Actuary, 160 N. LaSalle St., Chicago, Ill.
CAMPBELL, G. A., Ph.D. (Harvard) Research Engr., Amer. Tel. and Tel. Co., New York, N. Y. *Room 1654, 195 Broadway*
CAMPBELL, G. C., M.S. (Iowa) Research Section, Actuarial Div., Metropolitan Life Ins. Co., New York, N. Y. *Towaco, N. J.*
CAMPBELL, H. A., A.M. (Creighton) Teacher, Tech. High School, Omaha, Nebr. *32nd and Cuming Sts.*
CAMPBELL, JESSIE R., A.B. (Syracuse) Instr., Hollywood High School, Hollywood, Calif. *5400 Brynhurst Ave., Los Angeles, Calif.*
CAMPBELL, Prof. J. W., Ph.D. (Chicago) Univ. of Alberta, Edmonton South, Alta., Can.
CAMPBELL, Prof. W. B , A.M. (Cornell) Head of Dept., Judson Coll., Rangoon, Burma
CANDY, Prof. A. L., Ph.D. Univ. of Nebraska, Lincoln, Nebr. *Station A*
CANNING, JOSEPH, A.B. (Intermountain) Machinist, N. P. Ry. Co., Helena, Mont. *1813 Boulder Ave.*
CAPARÓ, Prof. J. A., Ph.D. (Notre Dame) Notre Dame Univ., Notre Dame, Ind. *1024 Leeper Ave., South Bend, Ind.*
CAPRON, Prof. PAUL, A.M. (Harvard) U. S. Naval Acad., Annapolis, Md. *208 Prince George St.*
CAREY, Asso. Prof. E. F. A., M.S. (California) Univ. of Montana, Missoula, Mont.
CARIS, Asst. Prof. P. A., Ph.D. (Pennsylvania) Univ. of Pennsylvania, Philadelphia, Pa. *717 Shadeland Ave., Drexel Hill, Pa.*
CARLEN, MILDRED E., M.S. (Brown) Registrar, Grad. School, Brown Univ., Providence R. I. *One Rhode Island Ave.*
CARLSON, J. A., B.S. (Washington) Asso., Univ. of Washington, Seattle, Wash. *2107 E. 102nd St.*
CARLSON, Asst. Prof. S. ELIZABETH, Ph.D (Minnesota) Univ. of Minnesota, Minneapolis, Minn. *3020 14th Ave. S.*
CARMAN, M. G., Ph.D. (Illinois) Head of Dept., State Teachers Coll., Murray, Ky.
CARMICHAEL, Prof. F. L., A.M. (Princeton) Math. and Statistics, Univ. of Denver, Denver, Colo. *2230 Colorado Blvd.*
CARMICHAEL, Prof. R. D., Ph.D. (Princeton) Univ. of Illinois, Urbana, Ill. *207 W. Washington Blvd.*
CARPENTER, Prof. D. R., A.M. (Princeton) Roanoke Coll., Salem, Va.
CARR, Prof. E. L., A.M. (Chicago) Head of Dept., Union Univ., Jackson, Tenn. *109 Camden St.*
CARR, Prof. F. E., Ph.D. (Chicago) Math. and Astr., Oberlin Coll., Oberlin, Ohio. *284 Forest St.*
CARROLL, Asst. Prof. I. S., A.M. (Columbia) Syracuse Univ., Syracuse, N. Y. *511 Comstock Ave.*
CARRUTH, Prof. W. M., A.B. (Cornell) Hamilton Coll., Clinton, N. Y.

CARSCALLEN, Asso. Prof. G. E., A.M. (Illinois) Wabash Coll., Crawfordsville, Ind. *112 N. Barr St.*

CARTER, C. C. States Attorney, Scott Co., Winchester, Ill. *Bluffs, Ill.* Honorary Life Member

CARUS, E. H., Ph.D. (Chicago) LaSalle, Ill.

CARUTHERS, R. W. E., B.S. (Miss. A. and M. Coll.) Asst. Director of Music, Mississippi State Coll., State Coll., Miss.

CARVER, Prof. W. B., Ph.D. (Johns Hopkins) Cornell Univ., Ithaca, N. Y. *White Hall*

CASE, Prof. J. E., A.M. (Gonzaga Univ.) St. Louis Univ., St. Louis, Mo.

CEDERBERG, Prof. W. E., Ph.D. (Wisconsin) Augustana Coll., Rock Island, Ill. *2542 22½ Ave.*

CELL, Asst. Prof. J. W., A.M. (Illinois) School of Eng., Southern Methodist Univ., Dallas, Tex. *On leave 1933-34, Asst., Univ. of Illinois, Urbana, Ill. 101 S. Lincoln St.*

CHAMBERS, Prof. G. G., Ph.D. (Pennsylvania) Univ. of Pennsylvania, Philadelphia, Pa. *251 S. 38th St.*

CHANG, Prof. H. C., Ph.D. (Michigan) National Central Univ., Nanking, China

CHARLES, Prof. R. L., A.M. (Lehigh) Physics, Franklin and Marshall Coll., Lancaster, Pa. *510 Race Ave.*

CHAROSH, MANNIS, B.S. (C.C.N.Y.) Teacher, New Utrecht High School, Brooklyn, N. Y.

CHASE, L. R. Instr., Rogers High School, Newport, R. I. *Boulevard Ter.*

CHELLEVOLD, Asst. Prof. J. O., A.M. (Northwestern) St. Paul Luther Coll., St. Paul Minn. *1002 Ivy St.*

CHENEY, Prof. W. F., Jr., Ph.D. (Mass. Inst. of Tech.) Head of Dept., Connecticut State Coll., Storrs, Conn.

CHITTENDEN, Prof. E. W., Ph.D. (Chicago) Univ. of Iowa, Iowa City, Iowa. *221 Physics Bldg.*

CHRISTIAN, R. S., A.M. (Westminster) Instr., Westminster Coll., Fulton, Mo.

CHRISTMAN, LAURA E., A.M. (Wisconsin) Teacher, Senn High School, Chicago, Ill. *1217 Elmdale Ave.*

CHURCH, Asso. Prof. E. F., C.E. (Syracuse) Photogrammetry, Univ. of Syracuse, Syracuse, N. Y. *Parish, N. Y.*

CHURCH, W. R., A.M. (Pennsylvania) Instr., Yale Univ., New Haven, Conn. *463 Skiff St., Hamden, Conn.*

CHURCHILL, Asst. Prof. R. V., Ph.D. (Michigan) Univ. of Michigan, Ann Arbor, Mich. *1459 Rosewood St.*

CLACK, Prof. R. W., A.M. (Grinnell) Math. and Astr., Alma Coll., Alma, Mich. *209 W. Downie St.*

CLAIRE, C. N., B.S. (Alfred) Asst. Mathematician, U. S. Coast and Geodetic Survey, Washington, D. C.

CLARK, Asso. Prof. A. G., A.M. (Colorado) Colorado Agric. Coll., Fort Collins, Colo.

CLARK, R. F., A.B. (Williams) Chm. Math. Dept., DeWitt Clinton High School, New York, N. Y. *194 Christie Hts. St., Leonia, N. J.*

CLARKE, Prof. E. H., Ph.D. (Chicago) Hiram Coll., Hiram, Ohio. *Box 283*

CLARKE, Sister M. BORGIA, A.M. (Catholic Univ.) Prof., Webster Coll., Webster Groves, Mo.

CLAUDETTE, Sister M., A.M. (Minnesota) Head of Dept., Coll. of St. Benedict, St. Joseph, Minn.

CLAWSON, Prof. J. W., M.A. (New Brunswick) Ursinus Coll., Collegeville, Pa.

CLAYTON, J. L., A.M. (Michigan) Instr., U. S. Naval Acad., Annapolis, Md. *20 Jefferson St.*

CLELAND, Prof. W. E., Ph.D. (Princeton) Geneva Coll., Beaver Falls, Pa. *North Hall*

CLEMENTS, Prof. G. R., Ph.D. (Harvard) U. S. Naval Acad., Annapolis, Md. *7 Thompson St.*

CLIFFORD, A. H., A.B. (Yale) Grad. Student, California Inst. of Tech., Pasadena, Calif. *317 Markham Pl.*

COBB, Prof. H. E., A.M. (Wesleyan) Lewis Inst., Chicago, Ill.

COBLE, Prof. A. B., Ph.D. (Johns Hopkins) Univ. of Illinois, Urbana, Ill. *702 W. Washington Blvd.*

COE, Asst. Prof. C. J., Ph.D. (Harvard) Univ. of Michigan, Ann Arbor, Mich. *2022 Hill St.*

COFFIN, Prof. L. M., A.M. (Michigan) Coe Coll., Cedar Rapids, Iowa. *1027 Second Ave.*

COHEN, Prof. ABRAHAM, Ph.D. (Johns Hopkins) Johns Hopkins Univ., Baltimore, Md.

COHEN, Asst. Prof. L. W., Ph.D. (Michigan) Univ. of Kentucky, Lexington, Ky. *176 Market St.*

COHEN, Asst. Prof. TERESA, Ph.D. (Johns Hopkins) Pennsylvania State Coll., State College, Pa.

COLAW, J. M., A.M. (Dickinson) Attorney at Law, Monterey, Va.

COLE, Prof. LENA R., A.M. (Missouri) Central Normal Coll., Danville, Ind.
COLEMAN, Prof. J. B., Ph.D. (California) Univ. of South Carolina, Columbia, S. C.
COLEMAN, Prof. R. H., A.B. (Charleston) Coll. of Charleston, Charleston, S. C.
COLLIER, MYRTIE, Ph.D. (Strasbourg) Head of Dept., Immaculate Heart Coll., Los Angeles, Calif. *320½ N. Alexandria Ave.*
COLLINS, O. C., M.A. (Oxford, England) Instr. in charge of Astr., Univ. of Nebraska, Lincoln, Nebr. *1920 S. 26th St.*
COLPITTS, Asso. Prof. JULIA T., Ph.D. (Cornell) Iowa State Coll., Ames, Iowa. *Cranford Apts.*
COLWELL, Prof. R. C., Ph.D. (Princeton) Physics, West Virginia Univ., Morgantown, W. Va. *332 Demain Ave.*
COLYER, Prof. E. E., A.M. (Kansas) State Teachers Coll., Hays, Kans. *408 W. 15th St.*
COMSTOCK, Prof. C. E., A.M. (Knox) Bradley Poly. Inst., Peoria, Ill. *203 Fredonia Ave.*
CONKLING, R. P., A.B. (Cornell) Head of Dept., Newark Tech. School and Central High School, Newark, N. J. *31 N. 10th St.*
CONKWRIGHT, Asso. Prof. N. B., Ph.D. (Illinois) Univ. of Iowa, Iowa City, Iowa. *120 Physics Bldg.*
CONLEE, R. H., A.B. (New Mexico) 300 W. Broadway, Fairfield, Iowa.
CONSTABLE, MARY LOUISE, A.M. (Pennsylvania) Teacher, Philadelphia High School for Girls, Philadelphia, Pa. *The Whittier, 140 N. 15th St.*
CONWELL, G. M., Ph.D. (Princeton) Master in Math., St. Paul's School, Concord, N. H.
CONWELL, Prof. H. H., Ph.D. (Wisconsin) Beloit Coll., Beloit, Wis.
COOK, Asso. Prof. A. J., Ph.D. (Chicago) Univ. of Alberta, Edmonton, Alta., Can. *Dept. of Math.*
COOK, G. S., A.M. (Kansas) Instr., State School of Mines, Rapid City, S. D.
COOLEY, HOLLIS, A.M. (Middlebury) Instr., New York Univ., New York, N.Y. *32 Waverley Pl.*
COOLIDGE, Prof. J. L., Ph.D. (Bonn) Harvard Univ., Cambridge 38, Mass. *27 Fayerweather St.*
COOPER, Prof. A. E., Ph.D. (Chicago) Applied Math., Univ. of Texas, Austin, Tex. *Rice Ct., Rio Grande St.*
COOPER, ELIZABETH M., Ph.D. (Illinois) Prin., Buckingham School, Cambridge, Mass. *10 Buckingham St.*
COPE, Prof. T. F., Ph.D. (Chicago) Marietta Coll., Marietta, Ohio
COPELAND, Asso. Prof. LENNIE P., Ph.D. (Pennsylvania) Wellesley Coll., Wellesley, Mass. *14 Waban St.*
COPP, P. T., A.M. (Ohio State) Instr., Gary City Coll., Gary, Ind. *432 Jefferson St.*
CORAL, MAX, Ph.D. (Chicago) Address unknown
CORBIN, Prof. C. E., A.M. (Northwestern) Coll. of the Pacific, Stockton, Calif. *117 W. Euclid Ave.*
COREY, S. A. 1079 23rd St., Des Moines, Iowa
CORLISS, J. J., Ph.D. (Michigan) Instr., Univ. of Michigan, Ann Arbor, Mich. *5 East Hall*
CORONA, Sister MARIA, Ph.D. (Fordham) Teacher, Mount St. Joseph Coll., Mount St. Joseph, Ohio
CORRAL Y ALEMAN, J. I., Ing. de Mines. Director de Montes y Mines, Republic of Cuba, Havana, Cuba. *Calzada esquina 13, Vedado*
COSBY, Prof. BYRON, A.M. (Missouri) Math. and Bus. Admin., State Teachers Coll., Kirksville, Mo. *707 E. Normal Ave.*
COURT, Asso. Prof. N. A., D.Sc. (Ghent, Belgium) Univ. of Oklahoma, Norman, Okla.
COWLES, Prof. W. H. H., A.M. (Columbia) Head of Dept., Math. and English, Pratt Inst., Brooklyn, N. Y. *215 Ryerson St.*
COWLEY, ELIZABETH B., Ph.D. (Columbia) 913 Arch St., N. S., Pittsburgh, Pa.
COX, DEAN C. S., A.M. (Vanderbilt) Dean and Prof., Southern Coll., Lakeland, Fla.
COX, H. M., A.M. (Duke) 223 Highland Ave., Toccoa, Ga.
CRAIG, A. T., Ph.D. (Iowa) Asso., Univ. of Iowa, Iowa City, Iowa. *119 Physics Bldg.*
CRAIG, Asst. Prof. C. C., Ph.D. (Michigan) Univ. of Michigan, Ann Arbor, Mich. *3020 Angel Hall.*
CRAIG, Adj. Prof. H. V., Ph.D. (Wisconsin) Applied Math., Univ. of Texas, Austin, Tex. *3208 Grandview Ave.*
CRAMLET, Asst. Prof. C. M., Ph.D. (Washington) Univ. of Washington, Seattle, Wash. *Phil. Hall.*
CRANDELL, F. F., A.B. (Wooster) Grad. Student, Ohio State Univ., Columbus, Ohio. *1618 Hunter Ave.*
CRANE, Asso. Prof. RUFUS, A.M. (Ohio State) Math. and Eng., Ohio Wesleyan Univ., Delaware, Ohio. *39 Montrose Ave.*
CRATHORNE, Asso. Prof. A. R., Ph.D. (Göttingen) Univ. of Illinois, Urbana, Ill. *802 Pennsylvania Ave.*

CRENSHAW, Prof. B. H., M.E. (Alabama Poly. Inst.) Alabama Poly. Inst., Auburn, Ala.
CROCKETT, Prof. C. W., C.E. (Rensselaer) Math. and Astr., Rensselaer Poly. Inst., Troy, N. Y. *221 Stow Ave.*
CROMWELL, Asst. Prof. D., A.B. (Baylor) John Tarleton Jr. Coll., Stephenville, Tex. *Box 134*
CROMWELL, J. W., Jr. A.M. (Dartmouth) Certified Publ. Accountant, Washington, D. C. *1815–13th St. N. W.*
CROSS, SAVANNAH L., A.M. (Michigan) Instr., State Teachers Coll., Nacogdoches, Tex. *321 North St.*
CROWE, Asso. Prof. S. E., A.M. (Michigan) Michigan State Coll., East Lansing, Mich.
CRUDELI, Prof. UMBERTO, Dr. in mat. (Rome) Director, Math. Inst., Univ. of Cagliari, Sardinia, Italy
CRUISE, L. L., M.S. (Kansas S.T.C., Hays) Teacher, Jr. Coll., Rochester, Minn.
CRUM, Prof. W. L., Ph.D. (Yale) Economics, Harvard Univ., Cambridge, Mass.
CULMER, Prof. ORPHA ANN, A.M. (Michigan) State Teachers Coll., Florence, Ala. *217 Oneal Ave.*
CUMMING, Asso. Prof. FORREST, A.M. (Georgia) Univ. of Georgia, Athens, Ga. *Box 786*
CUMMINGS, Prof. LOUISE D., Ph.D. Vassar Coll., Poughkeepsie, N. Y.
CUNHA, Prof. PEDRO JOSÉ DA. Math. Analysis, Faculty of Sc., Lisbon Univ., Lisbon, Portugal. *Rua de S. Bento, No. 706*
CURRIER, Asso. Prof. C. H., A.M. (Brown) Brown Univ., Providence, R. I.
CURRY, Asso. Prof. H. B., Ph.D. (Göttingen) Pennsylvania State Coll., State College, Pa. *522 S. Pugh St.*
CURTIS, Prof. H. B., Ph.D. (Cornell) Lake Forest Coll., Lake Forest, Ill. *11 College Campus*
CURTISS, Prof. D. R., Ph.D. (Harvard) Northwestern Univ., Evanston, Ill. *2023 Sherman Ave.*
CUTLER, E. H., Ph.D. (Harvard) Instr., Lehigh Univ., Bethlehem, Pa. *Dept. of Math.*
CUTTING, L. H., A.M. (Missouri) Teacher, Westport High School, Kansas City, Mo. *406 E. 43rd St.*

DADOURIAN, Prof. H. M., Ph.D. (Yale) Nat. Phil., Trinity Coll., Hartford, Conn. *125 Vernon St.*
DALAKER, Prof. H. H., Ph.D. (Cornell) Math. and Mech., Univ. of Minnesota, Minneapolis, Minn. *523 Walnut St. S. E.*
DALAL, R. D. Stock Broker, Bombay, India. *1 New Marine Lines*
DALTON, Prof. J. P., D.Sc. (St. Andrews; Cape) Univ. of the Witwatersrand, Johannesburg, S. Africa. *P. O. Box 1176*
DAME, MABELLE C., Ph.D. (Chicago) 50 Cedar St., Amesbury, Mass.
DANCER, Asst. Prof. WAYNE, A.M. (Ohio State) Univ. of Toledo, Toledo, Ohio. *2449 Lunaire Drive*
DANIELLS, Asst. Prof. MARIAN E., A.M. (Iowa State) Iowa State Coll., Ames, Iowa
DANTZIG, Asst. Prof. TOBIAS, Ph.D. (Indiana) Univ. of Maryland, College Park, Md.
DANZL, Rev. ARTHUR, A.M. (Columbia) Instr., St. Johns Univ., Collegeville, Minn.
DAPPERT, J. W. Civil Engineer, Taylorville, Ill. *Lock Box 141*
DARLING, F. W., A.B. (Cornell) Asso. Mathematician, U. S. Coast and Geodetic Survey, Washington, D.C.
DARNELL, Dean ALBERTUS, Ph.B. (Michigan) Lib. Arts Coll., Coll. of the City of Detroit, Detroit, Mich. *4841 Cass Ave.*
DARRAGH, MARGARET L., A.B. (Hanover Coll.) Teacher, Roosevelt High School, East Chicago, Ind. *4142 Magoun Ave.*
DAUGHERTY, R. D., M.S. (Iowa) Instr., State Agric Coll., Manhattan, Kans.
DAUS, Asso. Prof. P.H., Ph.D. (California) Univ. of California at Los Angeles, Los Angeles, Calif. *405 N. Hilgard Ave.*
DAVIS, Prof. D. R., Ph.D. (Chicago) State Teachers Coll., Montclair, N. J.
DAVIS, Asst. Prof. H. A., Ph.D. (Cornell) West Virginia Univ., Morgantown, W. Va. *307 Duquesne Ave.*
DAVIS, Asso. Prof. H. T., Ph.D. (Wisconsin) Indiana Univ., Bloomington, Ind. *712 E. Second St.*
DAVIS, Asso. Prof. J. E., A.M. (Wisconsin) Drexel Inst., Philadelphia, Pa.
DAVIS, Prof. J. M., A.M. (Kentucky) Univ. of Kentucky, Lexington, Ky. *340 Madison Pl.*
DAVIS, J. W., A.M. (Yale) Teacher, High School, Boston, Mass. *17 Wrentham St., Dorchester, Mass.*
DAVIS, U. P., A.M. (Florida) Instr., Univ. of Florida, Gainesville, Fla. *1635 W. Mechanic St.*
DAVIS, W. M., Ph.D. (Chicago) Instr., Armour Inst. of Tech., Chicago, Ill. *3300 Federal St.*
DAVISON, RACHEL, A.M. (Oberlin) Instr., Houghton Coll., Houghton, N. Y.
DEAN, ALICE C., A.M. (Rice) Fellow, Rice Inst., Houston, Tex.

DEARBORN, D. C., A.M. (Nebraska) University fellow, Duke Univ., Durham, N. C. *Box 4614, Duke Sta.*
DECHERD, Adj. Prof. MARY E., A.M. (Texas) Pure Math., Univ. of Texas, Austin, Tex.
DECK, Prof. L. J., A.M. (Pennsylvania) Muhlenberg Coll., Allentown, Pa.
DECKER, Prof. F. F., Ph.D. (Syracuse) Syracuse Univ., Syracuse, N. Y. *312 Marshall St.*
DECLEENE, Rev. L. A. V., Ph.D. (Catholic Univ.) Prof., Math. and Physics; Chm., Div. of Science, St. Norbert Coll., West DePere, Wis. *St. Norbert Abbey*
DECOU, Prof. E. E., M.S. (Chicago) Univ. of Oregon, Eugene, Ore. *929 Hilyard St.*
DEDERICK, L.S., Ph.D. (Harvard) Mathematician, Aberdeen Proving Ground, Md.
DE LA GARZA, E. Box 304, Brownsville, Tex.
DELONG, Prof. I. M., A.M. (Simpson) Emeritus, Univ. of Colorado, Boulder, Colo. *2009–13th St.*
DELURY, Prof. A. T., M.A. (Toronto) Univ. of Toronto, Toronto, Ont., Can.
DEMING, Prof. R. M., B.S. (Iowa State) Upper Iowa Univ., Fayette, Iowa
DENNISON, C. H., B.S. (Mass. Inst. of Tech.) Chemist, Amer. Rubber Co., Cambridge, Mass. *183 Norfolk St., Wollaston, Mass.*
DENTON, Asst. Prof. W. W., Ph.D. (Illinois) Univ. of Michigan, Ann Arbor, Mich.
DEUTSCH, RALPH, A.M. (Columbia) Teacher, New Utrecht High School, Brooklyn, N. Y. *654 Warwick St.*
DICE, ELIZABETH S., A.M. (Texas) Teacher, High School, Dallas, Tex.
DICKSON, Prof. L. E., Ph.D. (Chicago) Univ. of Chicago, Chicago, Ill. *5535 University Ave.*
DICKSTEIN, Prof. S., Ph.D. Math. and Hist., Univ. of Warsaw, Warsaw, Poland. *Marszalkowska St. 117*
DILLINGHAM, Prof. ALEXANDER, A.M. (Harvard) U. S. Naval Acad. ,Annapolis, Md.
DIMICK, Prof. C. E., A.M. (Pennsylvania) U. S. Coast Guard Acad., New London, Conn.
DINES, Prof. L. L., Ph.D. (Chicago) Head of Dept., Carnegie Inst. of Tech., Pittsburgh, Pa.
DINWIDDIE, Prof. A. B., Ph.D. (Virginia) Head of Dept., Tulane Univ., New Orleans, La. *Station 20*
DIX, Prof. L. E., B.S. (Tufts) Norwich Univ., Northfield ,Vt. *5 Spring St.*
DOAK, Prof. ELEANOR C., Ph.B. (Chicago) Mount Holyoke Coll., South Hadley, Mass.
DOAN, Asst. Prof. C. S., A.M. Purdue Univ., W. LaFayette, Ind. *415 Russell St.*
DOBBIN, Sister MARIOLA, A.M. (Wisconsin) Rosary Coll., River Forest, Ill.
DO BELL, Asst. Prof. H. A., Ph.D. (Cornell) State Coll. for Teachers, Albany, N. Y.
DODD, Prof. E. L., Ph.D. (Yale) Univ. of Texas, Austin, Tex. *3012 West Ave.*
DOERMANN, Asst. Prof. F. W., Ph.D. (Vienna) Mathl. Physics, New York Univ., New York, N. Y. *University Hts.*
DONAGHHO, Prof. J. S., A.M. (Marietta) Univ. of Hawaii, Honolulu, T. H. *961 Alewa Dr.*
DONCHIAN, P. S., A. B. (Yale) Vice-pres. and Genl. mgr., Samuel Donchian Rug Co., Hartford, Conn. *85 Gillett St.*
DORROH, J. L., Ph.D. (Texas) Instr., Johns Hopkins Univ., Baltimore, Md. *Dept. of Math.*
DORWART, H. L., Ph.D. (Yale) Instr., Williams Coll., Williamstown, Mass. *182 Main St.*
DOSTAL, Asst. Prof. B. F., A.M. (Indiana) Univ. of Florida, Gainesville, Fla. *Engineering Bldg.*
DOTTERER, Prof. J. E., A.M. (Illinois) Head of Dept., Manchester Coll., North Manchester, Ind.
DOUGHERTY, LUCY T., A.M. (Kansas) Head of Dept., Jr. Coll., Kansas City, Kans. *Gould Hotel*
DOUGLASS, Asst. Prof. R. D., Ph.D. (Mass. Inst. of Tech.) Mass Inst. of Tech., Cambridge, Mass. *76 Drew Rd., Belmont, Mass.*
DOWNING, F. A. Commerce Dept., Atlantic Coast Line R.R., Wilmington, N. C. *610 Dock St.*
DOWNING, Prof. H. H., Ph.D. (Chicago) Univ. of Kentucky, Lexington, Ky. *138 State St.*
DRAGO, E. A., B. S. (Cooper Union) Grad Student, New York Univ., New York, N. Y. *176 Grandview Ave., Mariners Harbor, Staten Island, N. Y.*
DRESDEN, Prof. ARNOLD, Ph.D. (Chicago) Swarthmore Coll., Swarthmore, Pa. *606 Elm Ave.*
DRESHER, MELVIN, B.S. (Lehigh) Grad. student, Yale Univ., New Haven, Conn.
DRESSEL, F. G., Ph.D. (Duke Univ.) Instr., Duke Univ., Durham, N. C. *Box 4393*
DREW, J. W., A.M. (Cornell) Head of Dept., Storer Coll., Harpers Ferry, W. Va. *Box 202.*
DRIVER, D. D., A.M. (Nebraska) Instr., Hesston Coll., Hesston, Kans.
DUBÉ, Prof. L. H., Ph.D. (Gregorian Univ., Rome) Higher Math., Ottawa Univ., Ottawa, Ont., Can.
DUERKSEN, J. A., A.B. (Bethel) Asst. Mathematician, U. S. Coast and Geodetic Survey, Washington, D. C. *3134 Monroe St. N. E.*
DUNCAN, D. C., Ph.D. (California) Instr., Univ. of California, Berkeley, Calif. *Box 5, Wheeler Hall*
DUNFORD, NELSON, A.M. (Chicago) 5607 Bartmer Ave., St. Louis, Mo.

D'UNGER, V. C., A.M. (Little Rock) Lincoln Natl. Life Ins. Co., Fort Wayne, Ind.
DUNKEL, Prof. OTTO, Ph.D. (Harvard) Washington Univ., St. Louis, Mo.
DUNLAP, L. T., B.S. (Marquette) Instr., Pennsylvania State Coll., State College, Pa. *Dept. of Math.*
DU PASQUIER, Prof. L. G., Ph.D. (Zürich) Head of Dept., Univ. of Neuchâtel, Neuchâtel, Switzerland. *Beaux-Arts 4*
DURELL, FLETCHER, Ph.D. (Princeton) Emeritus, formerly Head of Dept., Lawrenceville School, Lawrenceville, N. J. *Belleplain, N. J.*
DUREN, Asst. Prof. W. L., Jr., Ph.D. (Chicago) Tulane Univ., New Orleans, La.
DURFEE, Prof. W. H., Ph.D. (Cornell) Hobart Coll., Geneva, N. Y. *403 Pulteney St.*
DURFEE, Prof. W. P., Ph.D. (Johns Hopkins) Hobart Coll., Geneva, N. Y. *639 Main St.*
DUSTHEIMER, Prof. O. L., Ph.D. (Michigan) Astr. and Math., Baldwin-Wallace Coll., Berea, Ohio. *272 Beech St.*
DUVAL, Asso. Prof. E. P. R., A.M. (Harvard) Univ. of Oklahoma, Norman, Okla. *Faculty Exchange*
DWYER, Prof. P. S., A.M. (Penna. State) Antioch Coll., Yellow Springs, Ohio. *Box 94*
DYE, L. A., Ph.D. (Cornell) Instr., Cornell Univ., Ithaca, N. Y. *White Hall*

EAGLES, Prof. T. R., A.M. (North Carolina) Vice-Pres., Treas. and Prof. of Math., Howard Coll., Birmingham, Ala. *8016 Second Ave. S.*
EARHART, FRANC C., A.M. (Wisconsin) Lenox Coll., Hopkinton, Iowa
EARL, Asso. Prof. J. M., Ph.D. (Minnesota) Univ. of Omaha, Omaha, Nebr. *3160 Dodge St.*
EARLE, Prof. M. D., A.M. (Furman) Furman Univ., Greenville, S. C.
EASTHAM, J. N., Ph.D. (Catholic Univ.) Head of Dept., Nazareth Coll., Rochester, N. Y. *402 Augustine St.*
ECHOLS, Col. C. P. U. S. Milit. Acad., West Point, N. Y.
ECHOLS, Prof. W. H., C.E. (Virginia) Univ. of Virginia, University, Va.
EDINGTON, Prof. W. E., Ph.D. (Illinois) Head of Dept., DePauw Univ., Greencastle, Ind.
EDMONDSON, Prof. T. W., Ph.D. (Clark) New York Univ., New York, N. Y. *University Hts.*
EDMONSON, Asso. Prof. NAT, Jr., Ph.D. (Rice) A. and M. Coll. of Texas, College Station, Tex. *3717 E. 28th St., Bryan, Tex.*
EDMONSTON, J. H., A.B. (George Washington) Teacher, Paul Jr. High School, Washington, D. C. *1441 Fairmont St. N. W.*
EDWARDS, MYRTLE, A. M. (Georgia) Head of Dept., Bowdon State Coll., Bowdon, Ga.
EDWARDS, Asso. Prof. P. D., Ph.D. (Indiana) Ball State Teachers Coll., Muncie, Ind. *713 W. North St.*
EELLS, Prof. W. C., Ph.D. (Stanford) Educ., Stanford Univ., Stanford University, Calif *On leave 1933–34, U. S. Office of Education, Washington, D. C.*
EIDE, MARGARET CHAPMAN (Mrs. R. B.), A.M. (Wisconsin) State Teachers Coll., River Falls, Wis. *308 S. Second St.*
EIESLAND, Prof. J. A., Ph.D. (Johns Hopkins) West Virginia Univ., Morgantown, W. Va.
EISELE, CAROLYN, A.M. (Columbia) Instr., Hunter Coll., New York, N. Y. *650 E. 231 St.*
EISENHART, Prof. L. P., Ph.D. (Johns Hopkins) Dean of Grad. School, Princeton Univ., Princeton, N. J. *73 Nassau St.*
ELDER, J. D., Ph.D. (Calif. Inst. of Tech.) Instr., Univ. of Michigan, Ann Arbor, Mich. *Dept. of Math.*
ELLIOTT, Prof. W. W., Ph.D. (Cornell) Duke Univ., Durham, N. C. *Box 533*
ELSTON, J. S., A.B. (Cornell) Asst. Actuary, Travelers Ins. Co., Hartford, Conn.
EMCH, Prof. ARNOLD, Ph.D. (Kansas) Univ. of Illinois, Urbana, Ill. *1002 S. Orchard St.*
EMMONS, Prof. C. W., A.M. (Illinois) Simpson Coll., Indianola, Iowa. *1009 N. B. St.*
ENGSTROM, Asst. Prof. H. T., Ph.D. (Yale) Yale Univ., New Haven, Conn. *North Sheffield Hall*
ENRIQUES, Prof. FEDERIGO. Univ. of Rome, Rome, Italy. *Via Sardegna 50*
ENTZ, G. G., B.S. (Columbia) 1352 Poinsettia Pl., Hollywood, Calif.
ERICSON, HENRY, B.S. (Chicago) Teacher, Washington High School, Milwaukee, Wis. *3418 W. Juneau Ave.*
ERIKSON, Asso. Prof. C. M., Ph.D. (Michigan) Michigan State Normal Coll., Ypsilanti, Mich. *101 Wallace Blvd.*
ERNSBERGER, IVA B., A.M. (Nebraska) Teacher, Fullerton Jr. Coll., Fullerton, Calif.
ERWIN, GRACE, A.B. (Nebraska) Grad. Student, Univ. of Oklahoma, Norman, Okla. *719 Asp Ave.*
ERWIN, M. C. Head of Dept. High School, Reynolds, Ind.
ESCOTT, E. B., M.S. (Chicago) Actuary and Accountant, 1019 S. East Ave., Oak Park, Ill.
ESTY, Vice-Pres. T. C., A.M. (Amherst) Walker Prof. of Math., Amherst Coll., Amherst, Mass.

ETTINGER, W. J., B.S. in M.E. (Lewis Inst.) Designing Engineer, Edison Genl. Elec. Appliance Co., Chicago, Ill. *5600 W. Taylor St.*
ETTLINGER, Prof. H. J., Ph.D. (Harvard) Pure Math., Univ. of Texas, Austin, Tex. *3110 Harris Park Ave.*
EVANS, Prof. G. C., Ph.D. (Harvard) Pure Math., Rice Inst., Houston, Tex.
EVANS, G. W., A.B. (Harvard) Charlestown High School, Retired. *16 Beverly Rd., Swampscott, Mass.*
EVANS, Prof. H. B., Ph.D. (Pennsylvania) Univ. of Pennsylvania, Philadelphia, Pa. *College Hall*
EVANS, Asst. Prof. H. P., Ph.D. (Wisconsin) Univ. of Wisconsin, Madison, Wis. *North Hall*
EVANS, P. H. Vice-Pres., and Actuary, Northwestern Mut. Life Ins. Co., Milwaukee, Wis. *720 E. Wisconsin Ave.*
EVERETT, Prof. H. S., Ph.D. (Chicago) Extension Prof., Univ. of Chicago, Chicago, Ill.
EVERETT, Prof. J. P., Ph.D. (Columbia) Chm. Dept. of Math., State Teachers Coll., Kalamazoo, Mich. *907 W. South St.*
EVERETT, Asso. Prof. J. R., A. M. (Wisconsin) Colorado School of Mines, Golden, Colo. *1700 Washington St.*
EWIN, MARY, A. M. (George Washington) Teacher, Eastern High School, Washington, D.C. *3629 Tenth St. N. W.*
EWING, W. M., Ph.D. (Rice) Instr., Physics, Lehigh Univ., Bethlehem, Pa.

FAHNESTOCK, SARAH. Address unknown
FARNUM, Asst. Prof. FAY, Ph.D. (Cornell) Washington Square Coll., New York Univ., New York, N. Y.
FATTU, NICHOLAS, M.S. (Idaho) Instr., Itasca Jr. Coll., Coleraine, Minn.
FAULKNER, Prof. DONALD, A.B. (Stetson) J. B. Stetson Univ., DeLand, Fla.
FEDERICO, P. J., A.M. (George Washington) Asso. Examiner, U. S. Patent Office, Washington, D. C. *3711 Benton St. N. W.*
FEEMSTER, Prof. H. C., A.M. (Nebraska) York Coll., York, Nebr.
FEENBERG, EUGENE. Physics Dept., Harvard Univ., Cambridge, Mass.
FEHN, Asso. Prof. A. R., Ph.B. (Baldwin-Wallace) Centre Coll., Danville, Ky. *421 W. Lexington Ave.*
FEHR, Prof. HENRI, D.es S. (Geneva) Univ. of Geneva, Geneva, Switzerland. *110 Florissant St.*
FEINLER, Rev. F. J. Pastor, St. Peter's Catholic Church, Loudonville, Ohio. *130 Union St.*
FELD, J. M., Ph.D. (Columbia) 2940 Broadway, New York, N. Y.
FELDER, VIRGINIA I., M. S. (Tulane) Head of Dept., Copiah-Lincoln Jr., Coll., Wesson, Miss.
FERGUSON, Prof. C. E., A.M. (Missouri) Stephen F. Austin State Teachers Coll., Nacogdoches, Tex.
FERRY, Pres. F. C., Ph.D. (Clark) Hamilton Coll., Clinton, N. Y.
FIELD, Prof. FLOYD, A.M. (Harvard) Dean of Men, Georgia School of Tech., Atlanta, Ga. *2865 Tupelo Drive*
FIELD, Prof. PETER, Ph.D. (Cornell) Univ. of Michigan, Ann Arbor, Mich. *904 Olivia Ave.*
FIELD, S. E., A.M. (Michigan) Instr., Jr. Coll., Ironwood, Mich. *1003 N. Hemlock St.*
FINDLAY, Prof. WILLIAM, Ph.D. (Chicago) McMaster Univ., Hamilton, Ont., Can. *131 Chedoke Ave.*
FINKEL, Prof. B. F. Ph.D. (Pennsylvania) Math. and Physics, Drury Coll., Springfield, Mo. *1227 Clay St.* Honorary Life Member
FISANICK, GEORGE, A.B. (Penna. State) Box 584, Barnesboro, Pa.
FISCHER, C. H., Ph.D. (Iowa) Northwestern Nat. Life Ins. Co., Minneapolis, Minn.
FISHER, Prof. IRVING, Ph.D. (Yale) Pol. Econ., Yale Univ., New Haven, Conn. *460 Prospect St.*
FISK, N. C., Sc.D. (Michigan) 2023 Pingree Ave., Detroit, Mich.
FISKE, Prof. T. S., Ph.D. (Columbia) Columbia Univ., New York, N. Y.
FITCH, ANNIE L. M. (Mrs. EDWARD), Ph.D. (Cornell) Clinton, N. Y.
FITE, Prof. W. B., Ph.D. (Cornell) Columbia Univ., New York, N. Y. *Hamilton Hall*
FITTERER, Prof. J. C., C. E. (Colorado) Head of Dept., Colorado School of Mines, Golden, Colo.
FITZPATRICK, J. D., A.M. (Creighton) Instr., Creighton Univ., Omaha, Nebr. *Lib. Arts Coll.*
FLAGG, Asst. Prof. ELINOR B., M.S. (Illinois) Illinois State Normal Univ., Normal, Ill.
FLANDERS, Asst. Prof. D. A., Ph.D. (Pennsylvania) New York Univ., New York, N. Y.
FLANDERS, Asst. Prof. R. L., B.S. (Norwich) Civ. Eng., Oklahoma A. and M. Coll., Stillwater, Okla. *908 W. Fourth St.*
FLEET, Prof. R. R., Ph.D. (Heidelberg) Math. and Astr., Central Coll., Fayette, Mo.
FLEISHER, Asst. Prof. EDWARD, M.S. (New York Univ.) Brooklyn Coll., Brooklyn, N. Y. *125 Eastern Parkway, Apt. 6C.*

FLEMING, Asst. Prof. ANNIE W., A.M. (California) Iowa State Coll., Ames, Iowa. *719 Douglas Ave.*
FLEMING, J. A., B.S. (Cincinnati) Acting Director, Dept. of Terrestrial Magnetism, Carnegie Inst. of Washington, Washington, D. C. *5241 Broad Branch Rd. N. W.*
FLOOD, M. M., A.M. (Nebraska) Instr., Princeton Univ., Princeton, N. J.
FLYNN, B. D., A.M. (Trinity) Vice-Pres. and Actuary, Travelers Ins. Co., Hartford, Conn. *700 Main St.*
FLYNN, J. D., A.M. (Tufts) Statistician, Goodwin-Beach & Co., Investment Brokers, Hartford, Conn. *93 N. Beacon St.*
FOARD, Prof. C. W., Ph.D. (Iowa) Math. and Physics, Youngstown Coll., Youngstown, Ohio
FOBERG, J. A., Ph.D. (Pittsburgh) Head of Dept., State Teachers Coll., California, Pa. *Dept. of Math.*
FOCKE, Dean T. M., Ph.D. (Göttingen) Kerr Prof. of Math., Case School of Appl. Sc., Cleveland, Ohio
FOLK, PAULINE F., A.M. (Colorado) 519 N. Tejon St., Colorado Springs, Colo.
FOLLEY, Asst. Prof. K. W., Ph.D. (Toronto) Coll. of the City of Detroit, Detroit, Mich.
FORAKER, Prof. F. A., M.S. (Ohio Northern) Univ. of Pittsburgh, Pittsburgh, Pa. *1313 Macon Ave., Swissvale, Pa.*
FORD, Asst. Prof. L. R., Ph.D. (Harvard) Rice Inst., Houston, Tex.
FORD, Prof. W. B., Ph.D. (Harvard) Univ. of Michigan, Ann Arbor, Mich. *904 Forest Ave.*
FORSYTH, Asst. Prof. C. H., Ph.D. (Michigan) Dartmouth Coll., Hanover, N. H.
FORT, Prof. TOMLINSON, Ph.D. (Harvard) Analysis, Lehigh Univ., Bethlehem, Pa.
FOSTER, R. M., B.S. (Harvard) Dept. of Devel. and Research, Amer. Tel. and Tel. Co., New York, N. Y. *195 Broadway*
FOX, A. H., A.M. (Harvard) Instr., Union Coll., Schenectady, N. Y. *1710 Rugby Rd.*
FRANCIS XAVIER, Sister, Ph.D. (Fordham) Prof., St. Joseph's Coll., Brooklyn, N. Y. *245 Clinton Ave.*
FRANK, D. H., B.S. (C.C.N.Y.) Teacher, George Washington High School, New York, N. Y. *6053 Huxley Ave., Bronx*
FRANKEL, E. T., B.S. (C.C.N.Y.) Statistician, Natl. Indus. Conference Bd., Inc., New York, N. Y. *34–56 73rd St., Jackson Hts. N. J.*
FRANKENBUSH, BERTHA E., A.M. (Tulane) Teacher, High School, New Orleans, La. *7306 Hampson St.*
FRANKLIN, Asso. Prof. PHILIP, Ph.D. (Princeton) Mass. Inst. of Tech., Cambridge, Mass.
FREAS, ELIZABETH, A.B. (Lake Erie) 19200 S. Woodland Rd., Cleveland, Ohio
FRÉCHET, Prof. MAURICE. Prof. à la Faculté des Sciences, Institut Henri Poincaré, Paris, France. *1 Rue Pierre Curie, Paris (5)*
FRECHEVILLE, GEORGE, M.A. (Oxford; Cambridge) Agric. Econ. Research Inst., Univ. of Oxford, Oxford, England. *Parks Road*
FREMD, Dean LYDIA K., A.M. (Kentucky) Lees Coll., Jackson, Ky. *Eminence, Ky.*
FRINK, Prof. ORRIN, Jr., Ph.D. (Columbia) Pennsylvania State Coll., State College, Pa. *717 W. Beaver Ave.*
FRY, T. C., Ph.D. (Wisconsin) Bell Telephone Labs. New York, N. Y. *463 West St.*
FULLER, GORDON, Ph.D. (Michigan) Chm. of Dept., Sioux Falls Coll., Sioux Falls, S. D. *1305 S. Spring St.*
FULLER, K. G., A.M. (Nebraska) Tutor, Coll. of the City of New York, New York, N. Y.
FULMER, Asso. Prof. H. K., A.M. (Columbia) Georgia School of Tech., Atlanta, Ga.
FUNK, Asst. Prof. J. C., A.M. (Columbia) Jr. Coll., Santa Maria, Calif. *910 S. McClelland St.*
FUNKHOUSER, H. G., A.M. (Columbia) Instr., Phillips Exeter Acad., Exeter, N.H.

GABA, Prof. M. G., Ph.D. (Chicago) Univ. of Nebraska, Lincoln, Nebr.
GADSKE, R. E., M.S. (Northwestern) Teacher, High School, Carbondale, Ill. *510 S. Forest St.*
GAFAFER, W. M., Sc.D. (Johns Hopkins) Research Asso., Johns Hopkins Univ., Baltimore, Md. *185 Glenwood Ave., Leonia, N. J.*
GAGE, Asst. Prof. W. H., M.A. (Univ. of B.C.) Univ. of British Columbia, Vancouver, B.C., Can. *Dept. of Math.*
GAINES, Prof. R. E., A.M. (Furman) Univ. of Richmond, Richmond, Va.
GALE, Prof. A. S., Ph.D. (Yale) Univ. of Rochester, Rochester, N. Y. *11 Thayer St.*
GARABEDIAN, Asso. Prof. C. A., Ph.D. (Harvard) St. Stephen's Coll., Columbia Univ., Annandale-on-Hudson, N. Y.
GARABEDIAN, H. A., B.S. (Tufts) Mathematician, John Hancock Mut. Life Ins. Co., Boston, Mass. *197 Clarendon St.*
GARABEDIAN, H. L., Ph.D. (Princeton) Instr., Northwestern Univ., Evanston, Ill. *2253 Ridge Ave.*

GARDINER, J. A., A.M. (Pennsylvania) Teacher, Howard High School, Wilmington, Del. *1305 Tatnall St.*
GARNETT, W. W., A.M. (Kentucky) 1626 Lawson Y.M.C.A., 30 W. Chicago Ave., Chicago, Ill.
GARRETSON, Asso. Prof. W. V. N., Ph.D. (Michigan) Oklahoma A. and M. Coll., Stillwater, Okla. *222 Melrose Drive*
GARRETT, Prof. W. H., A.M. (Illinois Coll.) Math. and Astr., Baker Univ., Baldwin, Kans.
GARVER, Asso. Prof. RAYMOND, Ph.D. (Chicago) Univ. of California at Los Angeles, Los Angeles, Calif.
GAULT, Asso. Prof. A. E., M.S. (Chicago) Bradley Poly. Inst., Peoria, Ill.
GAVER, H. H., A.M. (Virginia) Headmaster, Black-Foxe Milit. Inst., Los Angeles, Calif. *637 N. Wilcox Ave.*
GAY, Asst. Prof. H. J., A.M. (Clark) Worcester Poly. Inst., Worcester, Mass. *7 Belvidere Ave.*
GAYLORD, H. D., A.M. (Harvard) Asst. Headmaster, Browne and Nichols School, Cambridge, Mass.
GAYLORD, Asst. Prof. LESLIE J., M.S. (Chicago) Agnes Scott Coll., Decatur, Ga.
GEHMAN, Prof. H. M., Ph.D. (Pennsylvania) Univ. of Buffalo, Buffalo, N. Y. *163 Winspear Ave.*
GENTRY, F. C., A.M. (Oklahoma) Instr., Jr. Coll., Wetumka, Okla.
GENTZLER, W. E., A.M. (Columbia) Sec'y of Appointments, Columbia Univ., New York, N. Y. *Earl Hall*
GEORGES, J. S., Ph.D. (Chicago) Crane Jr. Coll., Chicago, Ill. *2245 Jackson Blvd.*
GERMAN, Asso. Prof. F. C., A.M. (Illinois) State Teachers Coll., Pittsburg, Kans.
GERST, Rev. F. J., Ph.D. (Johns Hopkins) Dir. Dept. of Math., Loyola Univ., Chicago, Ill.
GETCHELL, B. C., A.M. (Harvard) 2009 Taylor Rd., East Cleveland, Ohio
GHORMLEY, Asst. Prof. L. O., A.M. (Chicago) Univ. of Tennessee, Knoxville, Tenn
GIBBENS, Asst. Prof. GLADYS, Ph.D. (Chicago) Univ. of Minnesota, Minneapolis, Minn. *122 Folwell Hall*
GIBSON, Prof. J. L., Ph.D. (Vienna) Univ. of Utah, Salt Lake City, Utah
GILL, Asst. Prof. B. P., Ph.D. (Columbia) Coll. of the City of New York, New York, N. Y. *302 Convent Ave.*
GILLESPIE, Prof. D. C., Ph.D. (Göttingen) Cornell Univ., Ithaca, N. Y. *Cayuga Hts.*
GILLESPIE, Prof. WILLIAM, Ph.D. (Chicago) Princeton Univ., Princeton, N. J. *Graduate College*
GILLEY, C. A., A.B. (Texas) Sul Ross State Teachers Coll., Alpine, Tex.
GILMAN, Asst. Prof. R. E., Ph.D. (Princeton) Brown Univ., Providence, R. I. *44 E. Manning St.*
GINGRICH, Prof. C. H., Ph.D. (Chicago) Math. and Astr., Carleton Coll., Northfield, Minn.
GINNINGS, R. M., M.S. (Chicago) Head of Dept., Western Illinois State Teachers Coll., Macomb, Ill. *314 N. Ward St.*
GIRARD, JEAN H. (Mrs. D. P.), A.B. (Hunter) Substitute, Hunter Coll., New York, N Y. *360 Central Park West*
GLAZIER, Asst. Prof. HARRIET E., A.M. (Chicago) Univ. of California at Los Angeles, Los Angeles, Calif. *1307 Lucile Ave.*
GLEASON, Asst. Prof. J. M., A.M. (California) State Teachers Coll., San Diego, Calif.
GLOVER, Prof. B. C., A.M. (Chicago) Otterbein Coll., Westerville, Ohio. *220 Hiawatha Ave.*
GLOVER, Prof. J. W., Ph.D. (Harvard) Univ. of Michigan, Ann Arbor, Mich. *620 Oxford Rd.*
GOLD, Asst. Prof. J. S., A.M. (Bucknell) Math. and Astr., Bucknell Univ., Lewisburg, Pa.
GOLDBERG, MICHAEL, A.M. (George Washington) Engineer, Bureau of Ordnance, Navy Dept., Washington, D. C. *2816 Connecticut Ave.*
GORDON, W. O., A.M. (Penna. State) Instr., Pennsylvania State Coll., State College, Pa. *Dept. of Math.*
GORRELL, Prof. G. W., A.M. (Ohio State) Univ. of Denver, Denver, Colo. *2236 S. Milwaukee St.*
GOSNELL, L. PATRICIA, A.M. (George Washington) Statistician, George Washington Univ., Washington, D. C. *1810 Connecticut Ave. N. W.*
GOULD, ALICE B., A.B. (Bryn Mawr) Care W. W. Vaughan, 53 State St., Boston, Mass.
GOUWENS, Asso. Prof. CORNELIUS, Ph.D. (Chicago) Iowa State Coll., Ames, Iowa. *109 N. Hyland Ave.*
GRABER, Prof. M. E., Ph.D. (Iowa) Physics, Morningside Coll., Sioux City, Iowa
GRAESSER, Asso. Prof. R. F., Ph.D. (Illinois) Univ. of Arizona, Tucson, Ariz.
GRAHAM, MABEL S (Mrs. F. W.), A.M. (New Mexico) Albuquerque, N. Mex.
GRAHAM, MARIA D., A.M. (Columbia) Instr., E. Carolina Teachers Coll., Greenville, N. C.

GRAHAM, Prof. P. H., A.M. (Virginia) Washington Square Coll., New York Univ., New York, N. Y.
GRANT, ALICE A., A.M. (Brown) 320 York Ave., Rock Hill, S. C.
GRANT, Prof. E. D., Ph.D. (Chicago) Math. and Registrar, Earlham Coll., Richmond, Ind. *330 College Ave.*
GRAUSTEIN, Prof. W. C., Ph.D. (Bonn) Harvard Univ., Cambridge, Mass. *32 Shepard St.*
GRAVATT, Prof. T. E., M.S. (Rutgers) Pennsylvania State Coll., State College, Pa.
GRAVES, Asso. Prof. G. H., Ph.D. (Columbia) Purdue Univ., W. LaFayette, Ind. *829 Main St.*
GRAVES, Asso. Prof. L. M., Ph.D. (Chicago) Univ. of Chicago, Chicago, Ill. *5823 Dorchester Ave.*
GREENLEAF, Prof. H. E. H., Ph.D. (Indiana) DePauw Univ., Greencastle, Ind. *1024 S. College Ave.*
GREVILLE, T. N. E., Ph.D. (Michigan) 1714–34th St. N. W., Washington, D. C.
GRIFFIN, Prof. F. L., Ph.D. (Chicago) Reed Coll., Portland, Ore.
GRIFFIN, HARRIET M., A.M. (Columbia) Instr., Brooklyn Coll., Brooklyn, N. Y. *918–76th St.*
GRIMES, Prof. N. C., A.M. (Wisconsin) Grove City Coll., Grove City, Pa. *415 Woodland Ave.*
GROVE, Prof. C. C., Ph.D. (Johns Hopkins) School of Commerce, Coll. of the City of New York, New York, N. Y. *143 Milburn Ave., Baldwin, L. I., N. Y.*
GROVE, Asso. Prof. V. G., Ph.D. (Chicago) Michigan State Coll., East Lansing, Mich. *438 Rosewood Ave.*
GRUMMANN, Asst. Prof. H. R., A.M. (Minnesota) Applied Math., Washington Univ., St. Louis, Mo. *Faculty Box 103*
GUMMER, Prof. C. F., Ph.D. (Chicago) Queen's Univ., Kingston, Ont., Can. *143 Collingwood St.*
GUMMERE, H. V., A.M. (Harvard) Dir., Strawbridge Mem. Observ., Haverford Coll., Haverford, Pa.
GUNDERSEN, Prof. CARL, Ph.D. (Columbia) Oklahoma A. and M. Coll., Stillwater, Okla. *615 College Ave.*
GUNN, GRACE T., A.M. (Northwestern) Instr., Univ. of Omaha, Omaha, Nebr. *24th and Pratt St.*
GUNSTAD, BORGHILD, B.S. (Minnesota) Asst. in Botany, Univ. of Minnesota, Minneapolis, Minn. *3245 Nicollet Ave.*
GUTTMAN, SOLOMON. 1801 Sixth Ave. N., Minneapolis, Minn.
GWINN, Asst. Prof. I. J., M.S. (Iowa) Physics and Math., Morningside Coll., Sioux City, Iowa
GWINNER, Prof. HARRY, M. E. (Maryland) Eng. Math., Univ. of Maryland, College Park, Md. *Box 31*

HAAS, Capt. ARTHUR, A.B. (C.C.N.Y.), LL.B. (New York Univ.) Thomas Jefferson High School, Brooklyn, N. Y. Retired. *Roxbury Station, Conn.*
HACKER, S. G., A.M. (Colorado) Thaw Fellow in Astr., Princeton Univ., Princeton, N. J. *14 Prospect Ave.*
HACKNEY, LILIAN, A.B. (West Virginia) Marshall Coll., Huntington, W. Va.
HADAMARD, Prof. JACQUES, LL.D. (Yale) École Polytech. et Coll. de France, Paris, France. *25 rue Alexandre de Humbolt, Paris 14e*
HADLEY, J. R., B.S. (Ohio State) Teacher, Cleveland, Ohio
HADLEY, Prof. LAURENCE, Ph.D. (Michigan) Purdue Univ., W. LaFayette, Ind. *Box 482*
HADLOCK, Asst. Prof. E. H., Ph.D. (Cornell) Univ. of Bangkok, Bangkok, Siam
HAERTTER, L.D., A.M. (Columbia) John Burroughs School, Clayton, Mo.
HAGEN, BEATRICE L., Ph.D. (Chicago) Instr., Pennsylvania State Coll., State College, Pa. *Dept. of Math.*
HAGGARD, Asst. Prof. H. W., M.S. (Chicago) Armour Inst. of Tech., Chicago, Ill. *6067 Ridge Ave.*
HALDEMAN, C. B. Ross, Butler Co., Ohio
HALL, F. C., A.M. (Columbia) Instr., New York Univ., New York, N. Y. *430 W. 119 St.*
HALL, Prof. H. L., A.M. (Indiana) Northwestern State Teachers Coll., Alva, Okla. *923 Seventh St.*
HALL, RUTH H., A.B. (Brown) Teacher, Mrs. Day's School., New Haven, Conn. *224 Edwards St.*
HALL, Prof. W. S., Sc.D. (Gettysburg) Lafayette Coll., Easton, Pa. *College Campus*
HALLETT, Prof. W. N., Ph.D. (Pennsylvania) Cedar Crest Coll., Allentown, Pa.
HALPERIN, Prof. HILLEL, E.E. (Liége), A.M. (Columbia) A. and M. Coll. of Texas, College Station, Tex.

HAMILTON, J. A., B.A. (Queen's Univ.) Instr., Pennsylvania State Coll., State College, Pa. *Dept. of Math.*
HAMILTON, W. M., A.M. (Michigan) Asst., U. S. Nautical Almanac Office, U. S. Naval Observ., Washington, D.C.
HAMMOND, Prof. E. S., Ph.D. (Princeton) Bowdoin Coll., Brunswick, Me. *9 Thompson St.*
HAMPTON, LAURENCE, A.M. (Nebraska) Instr., Alabama Poly. Inst., Auburn, Ala.
HANAWALT, Prof. F. W., A.M. (DePauw) Math. and Astr., Coll. of Puget Sound, Tacoma, Wash. *826 N. Steele St.*
HANCOCK, CLARA L., A.M. (Iowa) Instr., Jr. Coll., Virginia, Minn. *331½ Fifth St. S.*
HANCOCK, Prof. HARRIS, Ph.D. (Berlin) Univ. of Cincinnati, Cincinnati, Ohio
HANNA, Prof. U. S., Ph.D. (Pennsylvania) Indiana Univ., Bloomington, Ind. *828 Atwater Ave.*
HANSEN, Rev. POLYCARP. Prof., St. John's Univ., Collegeville, Minn.
HANSON, H. O., A.B. (Columbia) Mut. Life Ins. Co., Corona, L. I., N. Y. *106–30 Ditmars Blvd.*
HAPPELL, G. E., A.M. (Nebraska) Instr., Purdue Univ., W. LaFayette, Ind. *707 Hayes St.*
HARDING, Prof. A. M., Ph.D. (Chicago) Dir., Genl. Extension Service, Univ. of Arkansas, Fayetteville, Ark. *403 Washington St.*
HARDING, HOWARD, B.M.E. (Michigan) Rochester Gas and Elec. Corp., Rochester, N. Y. *29 Kingston St.*
HARDING, J. C. D., A.B. (Pennsylvania) Instr., Univ. of Delaware, Newark, Del.
HARDY, Prof. G. H. Trinity Coll., Cambridge, England
HARDY, Prof. J. G., Ph.D. (Johns Hopkins) Williams Coll., Williamstown, Mass.
HARKNESS, R. B., Jr., A.B. (Harvard) Chem. Engr., Merrimac Chem. Co., Everett, Mass.
HARP, E. L., Jr., A.M. (New Mexico) Artesia, N. Mex.
HARPER, H. D., A.M. (New York Univ.) Instr., Murray Hill Indus. High School., New York, N. Y. *40–04 Bowne St., Flushing, N. Y.*
HARRINGTON, Asst. Prof. C. E., M.E. (Cornell), M.S. (Buffalo) Asst. to the Dean, Univ. of Buffalo, Buffalo, N. Y. *52 Winter St.*
HARRIS, ELIZABETH L., M.S. (Washington Univ.) Eng. Asst., Southwestern Bell Tel. Co., St. Louis, Mo. *120 E. Adams Ave., Kirkwood, Mo.*
HARRIS, Asso. Prof. ISABEL, A.M. (Columbia) Westhampton Coll., Univ. of Richmond, Richmond, Va.
HARRIS, MARGARET E., A.M. (Teachers Coll., Columbia) Chair of Math., Grenada Coll., Grenada, Miss.
HARRY, C. H., Ph.D. (Johns Hopkins) Instr., Johns Hopkins Univ., Baltimore, Md. *Box 354*
HARRY, S. C., A.B. (Johns Hopkins) Head of Dept., City Coll., Baltimore, Md. *1528 Linden Ave.*
HARSHBARGER, Prof. FRANCES, Ph.D. (Illinois) Amer. Coll. for Girls, Istanbul, Turkey. *Galata Post Office, Box 1033*
HARSHBARGER, Prof. W. A., Sc.D. (Washburn) Dir., Science Dept., Washburn Coll., Topeka, Kans. *1401 College Ave.*
HART, BERTHA I., A.M. (Cornell) Cumberland, Md.
HART, Prof. J. N., C.E. (Maine), M.S. (Chicago) Math. and Astr., Univ. of Maine, Orono, Me. *123 Main St.*
HART, Prof. W. L., Ph.D. (Chicago) Univ. of Minnesota, Minneapolis, Minn.
HART, Asso. Prof. W. W., A.B. (Chicago) Univ. of Wisconsin, Madison, Wis. *R.F.D. 7*
HARTER, Prof. G. A., M.A. (St. John's) Univ. of Delaware, Newark, Del.
HARTIG, Asso. Prof. H. E., Ph.D. (Minnesota) Elec. Eng., Univ. of Minnesota, Minneapolis, Minn.
HARTLEY, M. C., Ph.D. (Illinois) Instr., Univ. of Illinois High School, Urbana, Ill. *603 E. Chalmers St., Champaign, Ill.*
HARTNELL, GEORGE. Observer in charge, Cheltenham Magn. Observ., U. S. Coast and Geodetic Survey, Cheltenham, Md.
HARTUNG, M. L., Ph.D. (Wisconsin) Instr., Teaching of Math., University High School, Madison, Wis.
HARWOOD, Asst. Prof. MAY N., A.M. (Syracuse) Syracuse Univ., Syracuse, N. Y. *200 Waverly Ave.*
HASKELL, Prof. M. W., Ph.D. (Göttingen) Emeritus, Univ. of California, Berkeley, Calif. *P. O. Box 3*
HASKELL, Adj. Prof. R. N., Ph.D. (Rice) Univ. of Texas, Austin, Tex.
HASSLER, Prof. J. O., Ph.D. (Chicago) Univ. of Oklahoma, Norman, Okla. *425 Lahoma Ave.*
HATCH, Asso. Prof. D. A., A.M. (Columbia) Lafayette Coll., Easton, Pa. *705 High St.*
HATCHER, Asso. Prof. T. W., M.E. (Va. Poly. Inst.), M.S. (Iowa State Coll.) Virginia Poly. Inst., Blacksburg, Va. *Box 476*

HATFIELD, Prof. CHARLES, A.M. (Tennessee) Georgetown Coll., Georgetown, Ky.
HAVILAND, E. K., Ph.D. (Harvard) Grad. Student, Johns Hopkins Univ., Baltimore, Md. *Port Deposit, Md.*
HAWKES, Dean H. E., Ph.D. (Yale) Columbia Univ., New York, N. Y. *Hamilton Hall*
HAYASHI, Prof. TSURUICHI, D. Sc. (Government) Emeritus, Coll. of Science, Tohoku Imperial Univ., Sendai, Japan. *Kamoncho 10*
HAYES, Asst. Prof. G. M., Ph.D. (Fordham) Coll. of the City of New York, New York, N. Y. *17 Lexington Ave.*
HAYES, J. J., B.S. (Utah) Instr., Univ. of Utah, Salt Lake City, Utah. *1148 E. 1st South St.*
HAZARD, Asso. Prof. C. T., A.M. (Indiana) Purdue Univ., W. LaFayette, Ind. *344 N. Western Ave.*
HAZELTINE, Prof. B. A., A.M. (Columbia) Dean of Men, Middlebury Coll., Middlebury, Vt. *38 South St.*
HAZLETT, Asso. Prof. OLIVE C., Ph.D. (Chicago) Univ. of Illinois, Urbana, Ill. *Box 574, Sta. A., Champaign, Ill.*
H'DOUBLER, F. T., Ph.D. (Wisconsin), M.D. (Harvard) Surgeon, Springfield, Mo. *804 Medical Arts Bldg.*
HEBEL, Asst. Prof. I. L., B.S. (Colorado) Colorado School of Mines, Golden, Colo.
HEDRICK, Prof. E. R., Ph.D. (Göttingen) Univ. of California at Los Angeles, Los Angeles, Calif.
HEFNER, Asst. Prof. R. A., Ph.D. (Chicago) Georgia School of Tech., Atlanta, Ga.
HEINS, A. E. 127 Homes Ave., Dorchester, Mass.
HENDERSON, Prof. ARCHIBALD, Ph.D. (North Carolina; Chicago) Head of Dept., Univ. of North Carolina, Chapel Hill, N. C. *721 E. Franklin St.*
HENDERSON, ROBERT, D.Sc. (Toronto) Vice-Pres. and Actuary, Equitable Life Assur. Soc., New York, N. Y. *393 Seventh Ave.*
HENDRICKS, A. F., B.S. (Valparaiso) Pres. Emeritus, Mayfield Coll., Marble Hill, Mo. *Wingate, N. C.*
HENROTEAU, F. C., Dr. of Physics and Math. (Brussels) Head of Astrophys. Dept. Dominion Observ., Ottawa, Ont., Can.
HEREN, Prof. MABEL M., M.S. (Northwestern) Knox Coll., Galesburg, Ill.
HERR, Asso. Prof. GERTRUDE A., M.S. (Iowa State Coll.) Iowa State Coll., Ames, Iowa
HERRON, Prof. C. L., A.M. (Hillsdale) Hillsdale Coll., Hillsdale Mich. *118 Hillsdale St.*
HERTZLER, E. A., M.S. (Michigan) Instr., Pratt Inst., Brooklyn, N. Y. *Ryerson St.*
HESS, E. E., A.B. (Juniata) Head of Dept., Huntingdon High School, Huntingdon, Pa. *312 Penn St.*
HESS, Asso. Prof. G. W., Ph.D. (Michigan) Howard Univ., Birmingham, Ala. *8009 Berney Ave.*
HESSELTINE, EVELYN, A.M. (Nebraska) Teacher, Normal School, Spearfish, S.D.
HICKEY, Prof. DEBORAH M., Ph.D. (Rice) Delta State Teachers Coll., Cleveland, Miss.
HICKS, Asst. Prof. H. C., Ph.D. (Calif. Inst. of Tech.) Carnegie Inst. of Tech., Pittsburgh, Pa. *906 Kennebec St.*
HICKSON, Asst. Prof. A. O., Ph.D. (Chicago) Duke Univ., Durham, N. C.
HIGHTOWER, Prof. RUBY U., Ph.D. (Missouri) Shorter Coll., Rome, Ga.
HILDEBRANDT, E. H. C., Ph.D. (Michigan) Instr., Brooklyn Coll., Brooklyn, N. Y. *165 Joralemon St.*
HILDEBRANDT, MARTHA, M.S. (Chicago) Teacher, Proviso High School, Maywood, Ill. *808 S. Second Ave.*
HILDEBRANDT, Prof. T. H., Ph.D. (Chicago) Univ. of Michigan, Ann Arbor, Mich. *1930 Cambridge Rd.*
HILDNER, R. C., A.M. (Ohio State) Grad. Student, Ohio State Univ., Columbus, Ohio. *1805 Morrell St., Pittsburgh, Pa.*
HILL, Prof. A. L., A.B. (Doane) State Teachers Coll., Peru, Nebr.
HILL, J. D., A.B. (U.C.L.A.) Grad. Student and Instr. (part time), Brown Univ., Providence, R. I.
HILL, Asso. Prof. L. S., Ph.D. (Yale) Hunter Coll., New York, N. Y. *12 Meadow Ave., Bronxville*
HILL, Asst. Prof. P. R., M.S. (Georgia) Univ. of Georgia, Athens, Ga. *190 Morton Ave.*
HILL, Prof. W. H., A.M. (Colorado) State Teachers Coll., Pittsburg, Kans. *1612 S. Walnut St.*
HILLARD, Asso. Prof. C. R., A.M. (Columbia) Wheaton Coll., Wheaton, Ill.
HILLE, Prof. EINAR, Ph.D. (Stockholm) Yale Univ., New Haven, Conn. *Graduate School*
HINSCH, Prof. V. B., E.M. (Missouri School of Mines) School of Mines and Metallurgy, Rolla, Mo.
HIRSCH, BLANCHE, B.S. (Columbia) Prin., Alcuin Prep. School, New York, N. Y. *48 W. 86th St.*
HIRSCHLER, Prof. E. J., M.S. (Chicago) Bluffton Coll., Bluffton, Ohio

HITCHCOCK, Prof. R. R., A.M. (Northwestern) Univ. of North Dakota, University, N. D.
HOARE, Prof. A. J., A.M. (Michigan) Head of Dept., Univ. of Wichita, Wichita, Kans. *1717 N. Holyoke Ave.*
HODGE, Asst. Prof. F. H., A.M. (Boston) Purdue Univ., W. LaFayette, Ind. *820 N. Main St.*
HOLGATE, Prof. T. F., Ph.D. (Clark) Northwestern Univ., Evanston, Ill. *617 Library Pl.*
HOLLCROFT, Prof. T. R., Ph.D. (Cornell) Wells Coll., Aurora, N. Y.
HOLLIS, ELINOR V., M.S. (Chicago) The Madeira School, Greenway, Va. *Fairfax Co.*
HOLLOWAY, W. R. Prin., High School, Manhattan, Ill.
HOLMES, Dean C. F., M.S. (Howard) Texas Coll., Tyler, Tex.
HOLMES, Asso. Prof. C. T., Ph.D. (Harvard) Bowdoin Coll., Brunswick, Me. *60 Spring St.*
HOLMES, Asst. Prof. F. F., A.B. (Amherst) Norwich Univ., Northfield, Vt. *12 Byam St.*
HOLT, E. W., A.B. (Colgate) 7 Jefferson St., Attleboro, Mass.
HOME, M. S., M.S. (McGill) Lecturer, Physics and Appl. Math., Univ. of Bishops Coll., Lennoxville, P.Q., Can.
HOOK, C. W., A.M. (North Carolina) Instr., Georgia School of Tech., Atlanta, Ga.
HOOPES, M. F., A.B. (Oberlin) Teacher, Southern State Teachers Coll., Springfield, S. D.
HOOPS, R. R. Deputy County Surveyor, Perry County, New Lexington, Ohio. *Box 392*
HOOVER, Asso. Prof. B. P., Ph.D. (Illinois) Carnegie Inst. of Tech., Pittsburgh, Pa. *2040 Fairlawn Ave., Wilkinsburg Manor*
HOPKINS, FANNIE, A.M. (Wisconsin) Teacher, High School, Waukesha, Wis. *162 S. James St.*
HOPKINS, Asso. Prof. L. A., Ph.D. (Chicago) Univ. of Michigan, Ann Arbor, Mich.
HOPPER, GRACE M. (Mrs. V. F.), A.M. (Yale) Instr., Vassar Coll., Poughkeepsie, N. Y. *316 West 95th St., New York, N. Y.*
HORN, MARVEL C., A.M. (Ohio State) Teacher, High School, Columbus, Ohio. *69 Sherman Ave.*
HORSBURGH, E. M., D.Sc. (Edinburgh) Lecturer in Technical Math. and Eng. Dyn., Univ. of Edinburgh, Edinburgh, Scotland. *11 Granville Ter.*
HORSFALL, Pres. I. O., Ph.D. (Cornell) Snow Coll., Ephraim, Utah
HOSFORD, Prof. H. M., Ph.D. (Illinois) Univ. of Arkansas, Fayetteville, Ark.
HOSKINS, Prof. L. M., C.E. (Wisconsin) Emeritus, Stanford Univ. *1240 Waverly St., Palo Alto, Calif.*
HOUSEHOLDER, Asst. Prof. A. S., A.M. (Cornell) Washburn Coll., Topeka, Kans.
HOUSEHOLDER, Asso. Prof. F. C., A.B. (Kansas) North Dakota Agric. Coll., Fargo, N. D. *1114–13th St. N.*
HOVE, E. MARIE, M.S. (Iowa) Instr., State Teachers Coll., Wayne, Nebr. *416 Main St.*
HOWARD, Prof. C. M., E. Mines (Ala. Poly. Inst.) Texas Woman's Coll., Fort Worth, Tex *3318 Ave. I*
HOWE, ANNA M., Ph.D. (Cornell) Box 245, Jordan, N. Y.
HOWE, G. K., B.S. (Worcester Poly. Inst.) Treasurer, Tougaloo Coll., Tougaloo, Miss.
HOWIE, Prof. J. M., A.M. (Columbia) Nebraska Wesleyan Univ., Lincoln, Nebr. *5218 Walker Ave.*
HOWLAND, Prof. L. A., Ph.D. (Munich). Vice-Pres. and Fisk Prof. of Math., Wesleyan Univ., Middletown, Conn. *Wesleyan Sta.*
HUBBS, Asst. Prof. H. N., Ph.D. (Cornell) Hobart Coll., Geneva, N. Y. *114 Washington St.*
HUBERT, Asso. Prof. W. G., Sc.D. (New York Univ.) Coll. of the City of New York. *125 Lee Ave., Yonkers, N. Y.*
HUFFER, Asso. Prof. R. C., A.M. (Illinois) Beloit Coll., Beloit, Wis. *729 Hobart Pl.*
HUGHES, Asst. Prof. H. K., Ph.D. (Michigan) Purdue Univ., W. LaFayette, Ind. *617 Dodge St.*
HUGHES, Asst. Prof. JEWELL C., Ph.D. (Chicago) Hunter Coll., New York, N. Y. *605 W. 115 St.*
HUGHES, Asso. Prof. W. M., A.M. (Baylor) State Coll. for Women, Denton, Tex. *517 Texas St.*
HUME, Chancellor ALFRED, D.Sc. (Vanderbilt) Univ. of Mississippi, University, Miss.
HUNT, Asst. Prof. G. H., C.E. (Cornell) Univ. of California at Los Angeles, Los Angeles, Calif. *926 Hyperion Ave.*
HUNT, Prof. MILDRED, Ph.D. (Chicago) Illinois Wesleyan Univ., Bloomington, Ill. *307 Phoenix Ave.*
HUNTINGTON, A. H., A.M. (Columbia) Asst. Prin., Beaumont High School, St. Louis, Mo. *736 Fairview Ave., Webster Groves, Mo.*
HUNTINGTON, Prof. E. V., Ph.D. (Strassburg) Mech., Harvard Univ., Cambridge, Mass.
HURRY, Prof. J. A., A.M. (California) Head of Dept., Physics, Jr. Coll., San Antonio, Tex.
HURST, Asso. Prof. J. W., Ph.D. (Illinois) State Coll., Bozeman, Mont. *621 S. 7th St.*
HURWITZ, SOLOMON, A.M. (Columbia) Teacher, Townsend Harris High School, Bronx, New York, N. Y. *1635 Popham Ave.*

HURWITZ, Prof. W. A., Ph.D. (Göttingen) Cornell Univ., Ithaca, N. Y. *White Hall 8*
HUSSEY, L. W., A.M. (Harvard) 14 Evelyn Pl., Bloomfield, N. J.
HUTCHERSON, Prof. W. R., Ph.D. (Cornell) Head of Dept., Berea Coll., Berea, Ky.
HUTCHINS, MABEL, A.B. (Blue Mountain) Head of Dept., Blue Mountain Coll., Blue Mountain, Miss.
HUTCHINSON, Prof. C. A., A.M. (Wittenberg) Eng. Math., Univ. of Colorado, Boulder, Colo. *837 Fifteenth St.*
HUTTO, Dean EUNICE, A.M. (Alabama) Head of Dept., Bob Jones Jr. Coll., Cleveland, Tenn.
HYDE, Asso. Prof. EMMA, A.M. (Chicago) State Agric. Coll., Manhattan, Kans.

ICAMEN, B.R., A.B. (Occidental), B.S.C.E. (South Carolina) Acting Head of Dept., Silliman Inst., Maasin, Leyte, P. I.
ILOFF, Prof. P. M., A.M. (Michigan) State Teachers Coll., Chico, Calif.
INGALLS, E. E., M.S. (Iowa) Albion Coll., Albion, Mich. *416 E. Cass St.*
INGOLD, Prof. BYRON, A.M. (Central Wesleyan) Culver-Stockton Coll., Canton, Mo.
INGOLD, Prof. LOUIS, Ph.D. (Chicago) Univ. of Missouri, Columbia, Mo. *206 Thilly Ave.*
INGRAHAM, Prof. M. H., Ph.D. (Chicago) Chm. of Dept., Univ. of Wisconsin, Madison, Wis. *Dept. of Math.*
IRWIN, Asso. Prof. FRANK, Ph.D. (Harvard) Univ. of California, Berkeley, Calif. *2921 Regent St.*
ISAACS, Prof. C. A., A.M. (Columbia) Head of Dept., State Coll. of Washington, Pullman, Wash.
IVANOFF, V. F., A.M. (California) 1646–26th Ave., San Francisco, Calif.

JABLONOWER, JOSEPH, Pd.M. (New York Univ.) Head of Dept., Fieldston School, New York, N. Y. *238th St. and Fieldston Road*
JACKSON, Prof. DUNHAM, Ph.D. (Göttingen) Univ. of Minnesota, Minneapolis, Minn. *119 Folwell Hall*
JACKSON, Prof. J. B., A.M. (Columbia) Univ. of South Carolina, Columbia, S.C. *227 S. Waccamaw Ave.*
JACKSON, Prof. ROSA L., Ph.D. (Chicago) Alabama Coll., Montevallo, Ala.
JAEGER, Prof. C. G., Ph.D. (Missouri) Pomona Coll., Claremont, Calif. *833 Indian Hill Blvd.*
JAMES, Asso. Prof. GLENN, Ph.D. (Columbia) Univ. of California at Los Angeles, Los Angeles, Calif. *405 Hilgard Ave., Brentwood Hts. Sta.*
JAMES, R. D., Ph.D. (Chicago) National Research Fellow, Cambridge Univ., Cambridge, England. *127 Mawson Road*
JAMISON, Prof. G. H., A.M. (Chicago) State Teachers Coll., Kirksville, Mo. *Box 116*
JANES, Asst. Prof. W. C., A.M. (Nebraska) State Agric. Coll., Manhattan, Kans.
JEFFERY, R. L., Ph.D. (Cornell) Acadia Univ., Wolfville, N. S.
JENSEN, C. M., Ph.D. (Minnesota) 3315–17th Ave. S., Minneapolis, Minn.
JEROME, Prof. JESSIE M., A.M. (Hiram) Hiram Coll., Hiram, Ohio
JIMEMEZ, Rev. FELIPE, B.S. (Notre Dame) Colegio de San Juan de Letran, Manila, P. I. *200 Beaterio St.*
JOFFE, S. A., M.S. (New York Univ.) Asst. Actuary, Retired, Mut. Life Ins. Co., New York, N. Y. *32 Nassau St.*
JOHN, Asso. Prof. F. W., M.E. (Cornell) Washington Square Coll., New York Univ., New York, N. Y. *199 N. Broadway, Yonkers, N. Y.*
JOHNSON, E. H., A.M. (Lehigh) Instr., Univ. of Detroit, Detroit, Mich. *17130 Birchcrest Drive*
JOHNSON, Prof. E. N., A.M. (Drake), M.S. (Kansas) Butler Coll., Indianapolis, Ind. *304 Downey Ave.*
JOHNSON, H. F., A.M. (Cincinnati) State Teachers Coll., Bowling Green, Ky.
JOHNSON, L. LOUISE, A.M. (Colorado) Instr., Extension Div., Univ. of Colorado, Boulder, Colo. *1108 Marine St.*
JOHNSON, Asst. Prof. MARIE M., Ph.D. (Chicago) Oberlin Coll., Oberlin, Ohio. *158 Elm St.*
JOHNSON, Asso. Prof. R. A., Ph.D. (Harvard) Brooklyn Coll., Brooklyn, N. Y. *66 Court St.*
JOHNSON, Asso. Prof. R. P., A.M. (Virginia; Harvard) Carnegie Inst. of Tech., Pittsburgh, Pa. *Dept. of Math.*
JOHNSON, W. W. Instr., Applied Math. and Mech., Huntington Poly. Inst., Cleveland, Ohio. *10722 Orville Ave.*
JOHNSTON, Asso. Prof. F. E., Ph.D. (Illinois) George Washington Univ., Washington, D.C.
JOHNSTON, Asst. Prof. K. P., B.A., B.Sc. (Queen's) Queen's Univ., Kingston, Ont., Can. *Dept. of Math.*
JOHNSTON, Prof. L. S., A.M. (Missouri) Univ. of Detroit, Detroit, Mich.

JOHNSTON, NELLIE M., A.B. (Kearney State Teachers Coll.) Warren Twp. High School, Gurnee, Ill.
JONAH, Asst. Prof. F. C., Ph.D. (Brown) Adelbert Coll., Western Reserve Univ., Cleveland, Ohio
JONES, Asst. Prof. B. W., Ph.D. (Chicago) Cornell Univ., Ithaca, N. Y. *Dept. of Math.*
JONES, Prof. E. H., A.M. (Harvard) Southern Methodist Univ., Dallas, Tex.
JONES, Lt. Col. HARRIS, B.S. (Mass. Inst. of Tech.) Prof., U. S. Milit. Acad., West Point, N. Y.
JONES, MARGARET E., A.M. (Ohio State) Instr., Ohio State Univ., Columbus, Ohio. *164 13th Ave.*
JONES, OLIVE M., A.M. (Columbia) Head of Dept., Queen's Chicora Coll., Charlotte, N. C.
JONES, P. C., B.S. (Mass. Inst. of Tech.) Bureau of Publication, Bell Telephone Labs., New York, N. Y. *463 West St.*
JONES, Asst. Prof. R. W., M.S. (Delaware), A.M. (Pennsylvania) Univ. of Delaware, Newark, Del. *204 W. 17th St., Wilmington, Del.*
JONES, S. I., B.S. (N. Tex. Norman Coll.) Asst. Secy. and Treas., Life and Casualty Ins. Co., Nashville, Tenn.
JORDAN, Asso. Prof. H. E., Ph.D. (Chicago) Univ. of Kansas, Lawrence, Kans. *1600 Kentucky St.*
JORDAN, Asso. Prof. M. F., A.M. (Maine) Astr., Univ. of Maine, Orono, Me.
JOSE, P. D., A.M. (Syracuse) 453 W. Central St., Delaware, Ohio
JURDAK, Prof. M. H., M.A. (Amer. Univ. of Beirut) American Univ. of Beirut, Beirut, Syria
JUSTICE, Asst. Prof. H. K., C.E. (Cincinnati) Univ. of Cincinnati, Cincinnati, Ohio. *4767 High Ridge Ave., Price Hill*
JUSTIN, Asst. Prof. E. M., M.S. (Case School) Case School of Appl. Science, Cleveland, Ohio

KAELIN, G. R., A.M. (California) Instr., Los Angeles Jr. Coll., Los Angeles, Calif. *855 N. Vermont Ave.*
KALCIK, G. J., A.B. (St. Norbert) 1375 Main St., Green Bay, Wis.
KALTENBORN, H. S., M.S. (Michigan) Grad. Student, Univ. of Michigan, Ann Arbor, Mich. *123 N. Thayer St.*
KARAPETOFF, Prof. VLADIMIR, M.M.E. (Leningrad) Elec. Eng., Cornell Univ., Ithaca, N. Y. *520 E. Buffalo St.*
KARNOW, HERMAN, A.M. (Colorado) 230 Liberty Ave., Brooklyn, N. Y.
KARPINSKI, Prof. L. C., Ph.D. (Strassburg) Univ. of Michigan, Ann Arbor, Mich. *1315 Cambridge Rd.*
KARPOV, A. V. Designing Engr., Aluminum Co. of Amer., Pittsburgh, Pa. *801 Gulf Bldg.*
KARR, LOIS, A.M. (Wisconsin) Instr., Lindenwood Coll., St. Charles, Mo.
KASNER, Prof. EDWARD, Ph.D. (Columbia) Columbia Univ., New York, N. Y. *22 W. 119th St.*
KEARNEY, DORA E., A.M. (Minnesota) State Teachers Coll., Cedar Falls, Iowa. *1310 W. 22nd St.*
KEELER, C. A., A.M. (California) 723 Third St., Clarkston, Wash.
KEFFER, RALPH, A.M. (Wisconsin) Asst. Actuary, Aetna Life Ins. Co., Hartford, Conn.
KEITH, Asst. Prof. MARY N., A.B. (Wellesley) Univ. of Redlands, Redlands, Calif. *930 Campus Ave.*
KELLER, E. R., A.M. (Tennessee) Teacher, High School, Townsend, Tenn.
KELLS, Asst. Prof. L. M., Ph.D. (Columbia) U. S. Naval Acad., Annapolis, Md. *23 Thompson St.*
KEMPNER, Prof. A. J., Ph.D. (Göttingen) Head of Dept., Univ. of Colorado, Boulder, Colo.
KENDALL, Asso. Prof. CLARIBEL, Ph.D. (Chicago) Univ. of Colorado, Boulder, Colo. *1305 Euclid Ave.*
KENNEDY, Adj. Prof. E. C., A.M. (Texas) Coll. of Mines, El Paso, Tex. *On leave 1933–34, Grad. Student, Univ. of Texas, Austin, Tex. 605 W. 25th St.*
KENNEDY, EVELYN M., A.M. (Cincinnati) Laws Fellow, Grad. School, Univ. of Cincinnati, Cincinnati, Ohio. *Blue Ash, Ohio*
KENNEDY, KATHRYN M., A.M. (Columbia) Critic, Normal Training High School, Terre Haute, Ind.
KENNELLY, Prof. A. E., Sc.D. (Pittsburgh; Toulouse) Emeritus, Elec. Eng., Harvard Univ., Cambridge, Mass.
KENNISON, L. S., Ph.D. (Calif. Inst. of Tech.) Instr., Brooklyn Coll., Brooklyn, N. Y. *165 Joralemon St.*
KERSTEN, Asst. Prof. H. J., A.M. (Chicago) Univ. of Cincinnati, Cincinnati, Ohio. *Dept. of Math., Coll. of Eng. and Commerce.*

KEULEGAN, C. H., Ph.D. (Johns Hopkins) Asso. Physicist, Bureau of Standards, Washington, D. C. *Room 311, N. W. Bldg.*
KEYES, Mrs. JULIA ATKINSON, A.M. (California) Asst. Prof., Univ. of Arizona, Tucson, Ariz. *Box 46, University Sta.*
KIEFER, Prof. E. C., M.S. (Michigan) James Millikin Univ., Decatur, Ill. *1229 W. Macon St.*
KIEFFER, NORA A., A.M. (Columbia) State Teachers Coll., Shippensburg, Pa.
KILLEBREW, Prof. C. D., M.S. (Alabama Poly. Inst.) Alabama Poly. Inst., Auburn, Ala.
KILLEN, Asso. Prof. C. G., M.S. (Louisiana) Louisiana State Normal Coll., Natchitoches, La.
KIMBALL, B. F., Ph.D. (Cornell) 1049 Wendell Ave., Schenectady, N. Y.
KIMBALL, S. H., Ph.D. (Harvard) Instr., Univ. of Rochester, Rochester, N. Y. *508 Morey Hall*
KIMBALL, T. C., A.M. (Princeton) Teacher, Lawrenceville School, Lawrenceville, N. J. *Box 207*
KINDLE, Prof. J. H., A.M. (Ohio State) Eng. Coll., Univ. of Cincinnati, Cincinnati, Ohio
KING, EULA WEEKS (Mrs. H. L.), Ph.D. (Missouri) 3233 Copelin Ave., St. Louis, Mo.
KINGERY, Prof. D. N., A.M. Macalester Coll., St. Paul, Minn. *135 Amherst St.*
KINGSTON, Prof. H. R., Ph.D. (Chicago) Math. and Astr., Univ. of Western Ontario, London, Ont., Can.
KINNEY, J. M., Ph.D. (Chicago) Head of Dept., Crane Jr. Coll., Chicago, Ill. *8058 Bennett Ave.*
KIRCHNER, Prof. W. H., B.S. (Worcester Poly. Inst.) Head of Dept., Drawing and Desc. Geom., Univ. of Minnesota, Minneapolis, Minn. *208 Main Eng. Bldg.*
KIRKHAM, W. J., A.M. (Indiana) Instr., Oregon State Coll., Corvallis, Ore. *Dept. of Math.*
KLAUBER, L. M., A.B. (Stanford) San Diego Cons. Gas and Elec. Co., San Diego, Calif. *233 W. Juniper St.*
KLINE, Prof. J. R., Ph.D. (Pennsylvania) Univ. of Pennsylvania, Philadelphia, Pa. *529 Riverview Rd., Swarthmore, Pa.*
KLINGER, E. L., A.M. (Illinois) Instr., Purdue Univ., W. LaFayette, Ind. *126 North St.*
KNAPP, Prof. G. A., A.M. (Hamilton) Maryville Coll., Maryville, Tenn.
KNEBELMAN, Asst. Prof. M. S., Ph.D. (Princeton) Princeton Univ., Princeton, N. J. *Fine Hall.*
KNEDLER, Prof. P. A., A.M. (Pennsylvania) State Teachers Coll., Kutztown, Pa. *East Texas, Pa.*
KNEPPER, Prof. M. MYRTLE, A.M. (Missouri) State Teachers Coll., Cape Girardeau, Mo. *909 College Hill.*
KNIGHT, Asst. Prof. ELIZABETH E., A.M. (Illinois) State Teachers Coll., Milwaukee, Wis. *2731 N. Downer Ave.*
KNIGHT, Prof. KATE K., A.B. (East Central S.T.C.) East Central State Teachers Coll., Ada, Okla. *1018 East Ninth St.*
KNIGHT, Asst. Prof. L. C., Ph.B. (Wooster) Coll. of Wooster, Wooster, Ohio.
KNOX, Prof. J. J., S.M. (Chicago) Dakota Wesleyan Univ., Mitchell, S. D. *1219 W. University Blvd.*
KOCH, E. H., Jr., B.S. in E.E. (Pennsylvania) Chm., Applied Math., Tech. High School, Brooklyn, N. Y. *208 N. Maple Ave., East Orange, N. J.*
KOKOMOOR, Prof. F. W., Ph.D. (Michigan) Univ. of Florida, Gainesville, Fla.
KONANTZ, Prof. EMMA L., A.M. (Ohio Wesleyan) Yeu Ching Univ., Peking, China.
KOOPMAN, Asst. Prof. B. O., Ph.D. (Harvard) Columbia Univ., New York, N. Y. *2940 Broadway*
KORGEN, R. L., A.M. (Harvard) Instr., Bowdoin Coll., Brunswick, Me. *15 Cleveland St.*
KOVALENKO, Asst. Prof. M. S., Ph.D. (Princeton) Math. and Astr., Swarthmore Coll., Swarthmore, Pa.
KOVARIK, Prof. A. M., Ph.D. (Minnesota), Sc.D. (Manchester) Physics, Yale Univ., New Haven, Conn. *Sloane Lab.*
KRATHWOHL, Prof. W. C., Ph.D. (Chicago) Armour Inst. of Tech., Chicago, Ill.
KREIDER, Prof. O. C., M.S. (Iowa State Coll.) Ellsworth Jr. Coll., Iowa Falls, Iowa.
KRYLOFF, Prof. NICOLAS, Doctor of Math. *honoris causa* (Kieff) Member of the Acad. of Sci. of Ukraine and of Leningrad, Univ. of Kieff, Kieff, Ukraine, U.R.S.S. *Box 135*
KUHN, Prof. H. W., Ph.D. (Cornell) Ohio State Univ., Columbus, Ohio. *1179 Fairview Ave.*
KUNKEL, P. V., A.M. (Pennsylvania) Head of Dept., State Teachers Coll., Kutztown, Pa. *Box 104, Trexlertown, Pa.*
KURZIN, W. H., M.S. (Chicago) Teacher, Crane Jr. Coll., Chicago, Ill. *1631 W. Roosevelt Rd.*
KUSNER, Asst. Prof. J. H., Ph.D. (Pennsylvania) Univ. of Florida, Gainesville, Fla.

LABOCCETTA, Ing. LETTERIO, C.E. (Naples) Patent Atty., Via S. Basilio 50, Rome (105), Italy.
LACY, Prof. CHARLOTTE M., A.M. (Chicago) West Virginia State Coll., Institute, W. Va. *Box 155*
LADNER, Asst. Prof. A. C., A.M. (Brown) Math. and Eng., Denison Univ., Granville, Ohio. *Box 253*
LADY, Prof. C. H., A.M. (Southern California) State Teachers Coll., Slippery Rock, Pa.
LAFON, GLADYS (Mrs. J. E.), A.M. (Penna. State) *314 A South Flood St., Norman, Okla.*
LAFON, J. E., A.M. (Oklahoma) Asst., Univ. of Oklahoma, Norman, Okla.
LAMBERT, W. D., A.M. (Harvard) Mathematician, U. S. Coast and Geodetic Survey, Washington, D. C.
LAMPLAND, C. O., A.M. (Indiana) Astronomer, Lowell Observ., Flagstaff, Ariz.
LANDIS, Prof. W. W., A.M. (Dickson) Dickinson Coll., Carlisle, Pa.
LANDRY, Prof. A. E., Ph.D. (Johns Hopkins) Catholic Univ. of America, Washington, D. C. *3624 13th St., Brookland, D. C.*
LANE, Prof. E. P., Ph.D. (Chicago) Univ. of Chicago, Chicago, Ill.
LANGE, LUISE, Ph.D. (Göttingen) *5728 Blackstone Ave., Chicago, Ill.*
LANGER, Prof. R. E., Ph.D. (Harvard) Univ. of Wisconsin, Madison, Wis. *1802 Jefferson St.*
LANGMAN, HARRY, Ph.D. (Columbia) Instr., Cooper Union, New York, N. Y. *1196 Eastern Parkway, Brooklyn, N. Y.*
LA PAZ, Asst. Prof. LINCOLN, Ph.D. (Chicago) Ohio State Univ., Columbus, Ohio. *Dept. of Math.*
LAREW, Prof. GILLIE A., Ph.D. (Chicago) Randolph-Macon Woman's Coll., Lynchburg, Va.
LARKIN, E. J., B.S. (Cooper Union) Instr., Cooper Union, New York, N. Y. *Westbury, L. I., N. Y. Box 595*
LARSON, Asst. Prof. OLGA, A.M. (Missouri) State Coll. for Women, Tallahassee, Fla.
LASLEY, Prof. J. W., Jr., Ph.D. (Chicago) Pure Math., Univ. of North Carolina, Chapel Hill, N. C. *523 Rosemary Lane*
LASSER, ABE. Student, Armour Inst. of Tech., Chicago, Ill. *1429 N. Washtenaw Ave.*
LATIMER, Prof. C. G., Ph.D. (Chicago) Univ. of Kentucky, Lexington, Ky. *Dept. of Math.*
LATSHAW, ELMER. 1839 N. 60th St., Philadelphia, Pa.
LATSHAW, V. V., Ph.D. (Indiana) Instr., Lehigh Univ., Bethlehem, Pa.
LAURENTINE MARIE, Sister, A.M. (Trinity Coll., Wash., D. C.) Prof., Emmanuel Coll., Boston, Mass. *400 The Fenway*
LAWTON, MILDRED T. (Mrs. M. B.), A.M. (Columbia) Asst. Teacher, Hunter Coll. High School, New York, N. Y. *81 Anderson Ave., Scarsdale, N. Y.*
LEAVENS, D. H., A.M. (Yale) Research Staff, Harvard Business School. *Soldiers Field, Boston, Mass.*
LEDESMA, M. C. Student, School of Eng., Milwaukee, Wis. *728 E. Mason St.*
LEFSCHETZ, Prof. SOLOMON, Ph.D. (Clark) Princeton Univ., Princeton, N. J.
LEHMAN, Prof. D. A., A.M. (Western Reserve) Math. and Astr., Goshen Coll., Goshen, Ind.
LEHMANN, C. H., A.M. (Columbia) Instr., Cooper Union Inst. of Tech., New York, N. Y. *29–05 165 St., Flushing, N. Y.*
LEHMER, D. H., Ph.D. (Brown) Inst. for Advanced Study, Princeton, N. J. *14 Spruce St.*
LEHMER, Prof. D. N., Ph.D. (Chicago) Univ. of California, Berkeley, Calif. *2736 Regent St.*
LEHR, MARGUERITE, Ph.D. (Bryn Mawr) Asso., Bryn Mawr Coll., Bryn Mawr, Pa. *The Tavern, Haverford, Pa.*
LEIB, Prof. D. D., Ph.D. (Johns Hopkins) Connecticut Coll., New London, Conn. *358 Mohegan Ave.*
LEIPER, Prof. C. L., Grad. (U. S. Naval Acad.) U. S. Naval Acad., Annapolis, Md.
LEITH, Asso. Prof. J. D., A.M. (Columbia) Univ. of North Dakota, Grand Forks, N. D.
LEMME, M. M., A.M. (Indiana) Instr., Univ. of Toledo, Toledo, Ohio
LENNAHAN, C. M. (Creighton Univ.) Observer, U. S. Weather Bureau, Washington, D. C. *736–22nd St. N. W., Apt. 207*
LENNES, Prof. N. J., Ph.D. (Chicago) Univ. of Montana, Missoula, Mont.
LEONARD, Prof. H. B., Ph.D. (Colorado) Univ. of Arizona, Tucson, Ariz. *Univ. Sta., Box 24*
LEONARD, KATHARINE, A.M. (Vermont) Head of Dept., State Teachers Coll., Moorhead, Minn. *Box 48*
LEPOWSKY, Mrs. FRANCES R., A.B. (Hunter) Grad. Student, Coll. of the City of New York; Substitute, James Madison High School, Brooklyn, N. Y. *285 Rugby Rd.*
LESTER, CAROLINE A., A.M. (Cornell) Instr., State Coll. for Teachers, Albany, N. Y.
LESTER, Vice-Pres. O. C., Ph.D. (Yale) Dean of Grad. School and Prof. of Physics, Univ. of Colorado, Boulder, Colo. *1061 Eleventh St.*

LeStourgeon, Asso. Prof. F. Elizabeth, Ph.D. (Chicago) Univ. of Kentucky, Lexington, Ky. *630 Maxwelton Ct.*

Levine, Jack, A.B. (U.C.L.A.) Part-time Instr., Princeton Univ., Princeton, N. J. *32 Bank St.*

Levy, Asst. Prof. Harry, Ph.D. (Princeton) Univ. of Illinois, Urbana, Ill. *356 Math. Bldg.*

Levy, Asst. Prof. Sophia H., Ph.D. (California) Univ. of California, Berkeley, Calif. *453 Wheeler Hall*

Lewandoski, Stephen, B.S. (Marquette) Address unknown

Lewis, Prof. Anna D., Ph.D. (Carleton) Lake Erie Coll., Painesville, Ohio

Lewis, Asso. Prof. A. J., Ph.D. (Colorado) Univ. of Denver, Denver, Colo. *2112 S. Columbine St.*

Lewis, Asso. Prof. C. F., M.S. (K.S.A.C.) State Agric. Coll., Manhattan, Kans.

Lewis, Asso. Prof. F. A., A.M. (Alabama) Univ. of Alabama, University, Ala.

Lewis, Prof. Florence P., Ph.D. (Johns Hopkins) Goucher Coll., Baltimore, Md. *2435 N. Charles St.*

Libman, E. E., Ph.D. (Illinois) Genl. Elec. Co., Marine and Air Craft Eng. Dept., Schnectady, N. Y. *River Rd. 1, Bldg. 23, Rm. 334*

Lieber, Lillian Rosanoff (Mrs. H. G.), Ph.D. (Clark) 258 Clinton Ave., Brooklyn, N. Y.

Light, Prof. G. H., Ph.D. (Yale) Univ. of Colorado, Boulder, Colo. *801 Base Line*

Linares, Enrique, Jr., B.S. in E.E. (Univ. of Santa Clara) Actg. Chief Engr., Central Board of Roads, Panama City, R. P. *P.O. Box 540*

Lindemann, Prof. C. A., A.M. (Bucknell) Pure Math., and Secy. of Faculty, Bucknell Univ., Lewisburg, Pa. *30 Brown St.*

Lindquist, Prof. Theodore, Ph.D. (Chicago) State Normal Coll., Ypsilanti, Mich. *103 Elm St.*

Lindsey, Prof. Louis, Ph.D. (Syracuse) Applied Math., Syracuse Univ., Syracuse, N. Y. *201 Scottholm Blvd.*

Linehan, Prof. P. H., Ph.D. (Columbia) Coll. of the City of New York, New York, N. Y., *346 Convent Ave.*

Linfield, Asso. Prof. B. Z., Ph.D. (Harvard) Univ. of Virginia, University, Va. *42 University Pl.*

Ling, Dean G. H., Ph.D. (Columbia) Univ. of Saskatchewan, Saskatoon, Sask., Can.

Linhart, G. A., Ph.D. (Yale) Head of Dept., Riverside Jr. Coll., Riverside, Calif.

Linker, Prof. J. B., Ph.D. (Johns Hopkins) Univ. of North Carolina, Chapel Hill, N. C.

Linton, M. A., A.M. (Haverford) Pres., The Provident Mut. Life Ins. Co., Philadelphia, Pa. *1632 Chestnut St.*

Litterick, W. S., M.S. (Brown) Instr., Peddie School, Hightstown, N. J.

Livingston, Asso. Prof. G. R., A.M. (California) State Teachers Coll., San Diego, Calif.

Locke, L. L., A.M. (Grove City Coll.) Teacher, Brooklyn Tr. School for Teachers, Brooklyn, N. Y. *950 St. John's Pl.*

Lockwood, E. C., A.M. (Brown) Instr., American Coll., Madura, S. India, *Tallakulam P.O.*

Lodwick, Deca, Ph.B. (Iowa) Head of Dept., High School, Long Beach, Calif. *4112 Colorado St.*

Logsdon, Mrs. Mayme I., Ph.D. (Chicago) Asso. Prof., Univ. of Chicago, Chicago, Ill.

Long, Asst. Prof. Florence, M.S. (Illinois) Earlham Coll., Earlham, Ind.

Long, J. K., A.B. (Washington and Jefferson) Instr., Purdue Univ., W. LaFayette, Ind. *138 Chauncey Ave.*

Long, Asst. Prof. T. R., A.M. (Rochester) Univ. of Rochester, Rochester, N. Y. *75 Cypress St.*

Long, Prof. W. F., A.B. (Franklin and Marshall) Math. and Astr., Franklin and Marshall Coll., Lancaster, Pa.

Longenecker, J. V., M.S. (Iowa) Actuary, Farmers and Bankers Life Ins. Co., Wichita, Kans. *701 Beacon Bldg.*

Longley, R. W., A.M. (Harvard) Teacher, High School, Windsor Junction, N. S., Can.

Longley, Prof. W. R., Ph.D. (Chicago) Yale Univ., New Haven, Conn.

Love, Prof. C. E., Ph.D. (Michigan) Univ. of Michigan, Ann Arbor, Mich. *1915 Scottwood Ave.*

Love, Rev. T. J., A.M. (Woodstock) Prof. Loyola Coll., Evergreen, Baltimore, Md.

Loveridge, Prof. L. E., Ph.D. (California) Seton Hall Coll., South Orange, N. J.

Lovett, Pres. E. O., Ph.D. (Virginia; Leipzig) Rice Inst., Houston, Tex.

Lovitt, Prof. W. V., Ph.D. (Chicago) Dean of Men, Colorado Coll., Colorado Springs, Colo.

Lowenstein, L. L., A.B. (Cornell) Auditor, N. Y. State Milk Control Bd., Albany, N. Y. *12 Chestnut St.*

Lowney, R. E., A.M. (Mich. State Coll.) Instr., Univ. of Wisconsin, Madison, Wis., *North Hall*

LUBBEN, Adj. Prof. R. G., Ph.D. (Texas) Univ. of Texas, Austin, Tex. *708 W. 22½ St.*
LUBIN, Asst. Prof. C. I., Ph.D. (Harvard) Coll. of Eng., Univ. of Cincinnati, Cincinnati, Ohio. *3612 Washington Ave.*
LUCK, Prof. J. J., Ph.D. (Virginia) Univ. of Virginia, University, Va. *Colonnade Club*
LUNN, Prof. A. C., Ph.D. (Chicago) Applied Math., Univ. of Chicago, Chicago, Ill.
LUTHER, C. F., Ph.D. (Stanford) Instr., Stanford Univ., Stanford University, Calif. *Box 2714*
LUTZ, Asst. Prof. JUNA M., A.M. (Chicago) Butler Univ., Indianapolis, Ind. *727 Fairfield Ave., Apt. 6*
LYLE, G. A., M.S. (Lehigh) Instr., U. S. Naval Acad., Annapolis, Md. *105 Fifth St.*
LYMAN, Prof. E. A., A.B. (Michigan) State Normal Coll., Ypsilanti, Mich. *308 Ellis St.*
LYONS, Asso. Prof. W. H., A.M. (Denver) State Agric. Coll., Manhattan, Kans. *816 Leavenworth St.*
LYTLE, Asso. Prof. E. B., Ph.D. (Yale) Teaching of Math., Univ. of Illinois, Urbana, Ill. *903 S. Busey Ave.*

MACCREADIE, Asst. Prof. W. T., Ph.D. (Cornell) Bucknell Univ., Lewisburg, Pa. *1425 W. Market St.*
MACCULLOUGH, Prof. R. H., M.S. (Lafayette) Defiance Coll., Defiance, Ohio
MACDONALD, I. J., M.S. (St. Bonaventure) Address unknown
MACDONALD, Prof. S. L., M.S. (Columbia) Head of Dept. of Math. and Astr., State Agric. Coll., Fort Collins, Colo.
MACDONALD, Prof. W. E., A.M. (Harvard) Lingnan Univ., Canton, China.
MACDOUGAL, H. B., M.S. (Iowa) South Dakota State Coll., Brookings, S. D. *Dept. of Math.*
MACDUFFEE, Asso. Prof. C. C., Ph.D. (Chicago) Ohio State Univ., Columbus, Ohio. *365 Oakland Park Ave.*
MACGREGOR, F. S., A.B. (Harvard) Mgr. College Dept., Harper & Bros., New York, N. Y. *49 E. 33rd St.*
MACKAY, ROY, A.M. (New Mexico) Teacher, High School, Albuquerque, N. M. *220 N. Maple St.*
MACKIE, Asso. Prof. E. L., Ph.D. (Chicago) Univ. of North Carolina, Chapel Hill, N. C. *702 Gimghoul Rd.*
MACMARTIN, CHRISTINE H., A.M. (Northwestern) Head of Dept., Deerfield Shields Twp. High School, Evanston, Ill. *2721 Reese Ave.*
MACMILLAN, Prof. W. D., Ph.D. (Chicago) Astr., Univ. of Chicago, Chicago, Ill.
MAC NEISH, Asso. Prof. H. F., Ph.D. (Chicago) Head of Dept., Brooklyn Coll., Brooklyn, N. Y. *185 Lakeview Ave., Scarsdale, N. Y.*
MCALISTER, Prof. E. H., A.M. (Oregon) Mech. and Astr., Oregon State Coll., Corvallis, Ore.
MCCAIN, GERTRUDE I., Ph.D. (Indiana) Box 64, Delphi, Ind.
MCCARTHY, Asst. Prof. E. D., A.M. (Penna. State) Eng. Coll., Univ. of Detroit, Detroit, Mich.
MCCARTY, A. L., A.M. (California) Head of Dept., Lowell High School, San Francisco, Calif. *1798 Grove St., Apt. 6*
MCCLELLAN, ADA A., B.S. (Chicago) 313 N. New Hampshire Ave., Los Angeles, Calif.
MCCLENON, Prof. R. B., Ph.D. (Yale) Grinnell Coll., Grinnell, Iowa. *1105 Park St.*
MCCORMICK, Prof. CLARENCE, A.M. (Clark) State Teachers Coll., Weatherford, Okla.
MCCORMICK, Asst. Prof. W. W., M.S. (Michigan) Geneva Coll., Beaver Falls, Pa. *North Hall*
MCCOY, Prof. DOROTHY, Ph.D. (Iowa) Belhaven Coll., Jackson, Miss.
MCCOY, Asst. Prof. N. H., Ph.D. (Iowa) Smith Coll., Northampton, Mass. *24 Harlow Ave.*
MCDILL, Prof. R. M., A.M. (Indiana) Hastings Coll., Hastings, Nebr. *129 E. 7th St.*
MCDONALD, JANET, A.M. (Tulane) Head of Dept., Hinds Jr. Coll., Raymond, Miss.
MCDONALD, Mrs. KIRTLAND, Ph.D. (California) Hotel Mayfair, Los Angeles, Calif.
MCDONOUGH, D. L., Ph.D. (Pennsylvania) Teacher, Overbrook High School; Drexel Inst., Evening Dept., Philadelphia, Pa. *18 Sunshine Rd., Upper Darby, Pa.*
MCDOUGLE, EDITH A., A.B. (Delaware) Instr., Women's Coll., Univ. of Delaware, Newark, Del.
MCEWEN, Prof. G. F., Ph.D. (Stanford) Oceanographer, Scripps Inst., Univ. of California. *Box 68, La Jolla, Calif.*
MCEWEN, W. H., Ph.D. (Minnesota) Mount Allison Univ., Sackville, N. B., Can. *Box 475*
MCFARLAN, Asst. Prof. L. H., Ph.D. (Missouri) Univ. of Washington, Seattle, Wash.
MCFARLAND, Asst. Prof. DORA, A.M. (Oklahoma) Univ. of Oklahoma, Norman, Okla.
MCFARLAND, ELSIE J., Ph.D. (California) 920 E. State St., Boise, Idaho

McGAVOCK, Asso. Prof. MARTHA P., A.M. (Chicago) Rockford Coll., Rockford, Ill.
McGAW, Prof. F. M., B.S. (Wesleyan Univ.) Math. and Eng. Drawing, Cornell Coll., Mt. Vernon, Iowa.
McGIFFERT, Asso. Prof. JAMES, Ph.D. (Columbia) Pure Math., Grad. Dept., Rensselaer Poly. Inst., Troy, N. Y. *169 Eighth St.*
McGINLEY, MARGARET F., A.M. (Colorado) Teacher, Denver Schools, Denver, Colo. *1601 E. Mississippi Ave.*
McKELVEY, Asso. Prof. J. V., Ph.D. (Cornell) Iowa State Coll., Ames, Iowa. *2117 Graeber St.*
McKELVEY, MARTHA M. (Mrs. J. V.), M.S. (Iowa) Instr., Iowa State Coll., Ames, Iowa. *2117 Graeber St.*
McLAUGHLIN, Prof. J. A., M.S. (Colgate) Head of Dept., St. Bonaventure's Coll., Allegany, N. Y.
McMASTER, A. S., M.S. in C.E. (Colorado) Instr., Eng. Math., Univ. of Colorado, Boulder, Colo. *Coll. of Engineering*
McMILLAN, MARY B., A.M. (Wisconsin) 1341 Third St. S., Wisconsin Rapids, Wis.
McNELLY, Sister MARY OF THE PRESENTATION, A.M. (Catholic Univ.) Prof., Our Lady of the Lake Coll., San Antonio, Tex.
McSHANE, E. J., Ph.D. (Chicago) Instr., Princeton Univ., Princeton, N. J. *43 Linden Lane*
McSWEENY, Prof. A. A., A.M. (Montana) Head of Dept., John Tarleton Agric. Coll., Stephenville, Tex.
MADDOX, Prof. A. C., A.M. (Columbia) State Normal Coll., Natchitoches, La. *405 New Second St.*
MAGEE, S. R. Kinderhook, Columbia Co., N. Y.
MAIDEN, W. M., A.M. (Virginia) Washington Square Coll., New York Univ., New York, N. Y. *Washington Sq. E.*
MAIZLISH, Prof. ISRAEL, Ph.D. (Minnesota) Physics and Math., Centenary Coll., Shreveport, La.
MAJELLA, Brother, A.M. (Catholic Univ.) St. John's Prep. School, Danvers, Mass.
MALE, Asst. Prof. C.T., M.C.E. (Union) Union Coll., Schenectady, N. Y. *Niskayuna, Schenec. Co., N. Y.*
MALLORY, Asso. Prof. V. S., A.M. (Columbia) State Teachers Coll., Montclair, N. J.
MANCHESTER, Prof. R. E., A.M. (Michigan) Head of Dept., and Dean of Men, Kent State Coll., Kent, Ohio
MANGOLD, Prof. M. CECELIA, Ph.D. (Catholic Univ.) Trinity Coll., Washington, D. C.
MANNING, Asso. Prof. F. L. M.S. (Rutgers) Ursinus Coll., Collegeville, Pa.
MANNING, Asso. Prof. H. P., Ph.D. (Johns Hopkins) Emeritus, Brown Univ., Providence, R. I. *148 Governor St.*
MANSON Prof. E. S., Jr., M.S. (Mass. Inst. of Tech.) Astr., Ohio State Univ., Columbus, Ohio
MANY, Asst. Prof. ANNA E., A.M. (Tulane) Counselor to Women, Newcomb Coll., New Orleans, La.
MARCH, Prof. H. W., Ph.D. (Munich) Univ. of Wisconsin, Madison, Wis. *1825 Summit Ave.*
MARDEN, Asst. Prof. MORRIS, Ph.D. (Harvard) Univ. of Wisconsin, Extension Div., Milwaukee, Wis. *623 W. State St.*
MARKOWITZ, MAX, B.S. (Brooklyn) Address unknown
MARM, Prof. ANNA, A.M. (Kansas) Bethany Coll., Lindsborg, Kans. *741 N. 2nd St.*
MARRIOTT, Prof. R. W., Ph.D. (Pennsylvania) Swarthmore Coll., Swarthmore, Pa. *213 Lafayette Ave.*
MARSHALL, Prof. WILLIAM, Ph.D. (Zürich) Head of Dept., Purdue Univ., LaFayette, Ind. *1017 State St.*
MARTIN, Prof. A. W., Ph.D. (Chicago) Coll. of Puget Sound, Tacoma, Wash. *3209 N. 15th St.*
MARTIN, Prof. EMILIE N., Ph.D. (Bryn Mawr) Mount Holyoke Coll., South Hadley, Mass.
MARTIN, MARY C., A.M. (Columbia) Teacher, High School, Freeport, Ill. *1154 W. Stephenson St.*
MARTYN, W. J., M.A. (New Zealand) Mathematical Master, Otago Boys High School, Dunedin, New Zealand
MARY ALOYSIUS, Sister, A.M. (Chicago) Instr., Coll. of St. Catherine, St. Paul, Minn.
MARY CORDIA, Sister, Ph.D. (Johns Hopkins) Prof., Notre Dame Coll., Baltimore, Md. *Charles Street Ave.*
MARY FELICE, Sister, Ph.D. (Catholic Univ.) Prof., Mount Mary Coll., Milwaukee, Wis.
MARY PAULA, Sister, M.S. (Notre Dame) Prof., Marygrove Coll., Detroit Mich.
MARY THECLA, Sister, Ph.D. (Fordham) Teacher, Queen of All Saints High School, Brooklyn, N. Y. *315 Clinton Ave.*

MASON, RUTH G., Ph.D. (Chicago) Private research, 1127 Fresno Ave., Berkeley, Calif.
MASON, Prof. T. E., Ph.D. (Indiana) Purdue Univ., LaFayette, Ind. *103 Waldron St.*
MASON, Asst. Prof. W. E., M.E. (Michigan) Applied Math., Univ. of California at Los Angeles, Los Angeles, Calif.
MATHESON, Prof. JOHN, M.A. (Queen's) Queen's Univ., Kingston, Ont., Can.
MATHEWSON, Asst. Prof. L. C., Ph.D. (Illinois) Dartmouth Coll., Hanover, N.H.
MATHIAS, FLORENTINA, A.M. (Ohio State) Teacher, High School, Chillicothe, Ohio. *38 Ewing St.*
MATHIAS, H. R., A.M. (Indiana) Instr., Bowling Green State Coll., Bowling Green, Ohio. *303 N. Prospect St.*
MATHIS, BUENA C., A.M. (Kentucky) Teacher, Bryan Sta. High School, Lexington, Ky. *R.F.D. 7*
MATTESON, Asso. Prof. JANE, A.M. (Cornell) Roosevelt School, Michigan State Normal Coll., Ypsilanti, Mich. *102 N. Hamilton St.*
MAURUS, Prof. E. J., M.S. (Notre Dame) Univ. of Notre Dame, Notre Dame, Ind. *L.B. 75*
MAY, LIDA B., A.M. (Texas) Teacher, High School, Borger, Tex. *Box 1403*
MEACHAM, Prof. E. D., Ph.D. (Chicago) Univ. of Oklahoma, Norman, Okla. *712 Lindsay Ave.*
MEADE, MARY E., A.M. (Virginia) Instr. and Acting Dean of Women, Martin Coll., Pulaski, Tenn.
MEARS, Asst. Prof. FLORENCE M., Ph.D. (Cornell) George Washington Univ., Washington, D. C.
MEBANE, Asso. Prof. W. N., Jr., A.M. (Cornell) Davidson Coll., Davidson, N. C. *Box 274*
MEDER, Asso. Prof. A. E., A.M. (Columbia) Acting Dean, New Jersey Coll. for Women, New Brunswick, N. J.
MEEK, KATE M. High School, Pasadena, Calif. *919 E. California St.*
MELVILLE, Asso. Prof. C. E., A.B. (Northwestern) Clark Univ., Worcester, Mass.
MENDENHALL, Pres. W. O., Ph.D. (Michigan) Friends Univ., Wichita, Kans.
MENKE, Asst. Prof. H. E., A.M. (Ohio State) Otterbein Coll., Westerville, Ohio. *124 W. Home St.*
MENSENKAMP, L. E., A.M. (Illinois) Instr., High School, Freeport, Ill. *808 W. American St.*
MENUET, Asso. Prof. R. L., B.E. (Tulane) Tulane Univ., New Orleans, La.
MERCEDES, Sister M., M.S. (Notre Dame) Instr., Toledo Teachers Coll., Toledo, Ohio. *2413 Collingwood Ave.*
MERGENDAHL, Asst. Prof. T. E., M.S. (Tufts) Tufts Coll., Tufts College, Mass. *128 Professors Row*
MERRILL, Prof. A. S., Ph.D. (Chicago) Univ. of Montana, Missoula, Mont. *541 Beckwith Ave.*
MERRILL, Prof. HELEN A., Ph.D. (Yale) Emeritus, Wellesley Coll., Wellesley, Mass.
MERRIMAN, Asst. Prof. G. M., Ph.D. (Cincinnati) Pure Math., Univ. of Cincinnati, Cincinnati, Ohio
MERRISS, A. A. 4227 N. E. 23rd Ave., Portland, Ore.
MESSICK, C. A., Ph.D. (Chicago) Route 3, Gainesville, Fla.
MESSICK, Prof. J. F., Ph.D. (Johns Hopkins) Emory Univ., Emory University, Ga.
MEWBORN, A. B., M.S. (Arizona) Instr., Univ. of Arizona, Tucson, Ariz. *Box 4325, Univ. Sta.*
MEYER, Prof. H. A., Ph.D. (Iowa) Hanover Coll., Hanover, Ind. *Box 3*
MEYER, Prof. J. B., M.S. (Purdue) Head of Dept., State Teachers Coll., Valley City, N.D. *814 Fifth Ave.*
MEYER, Rev. J. H. Spring Hill Coll., Mobile, Ala.
MICHAL, Asso. Prof. A. D., Ph.D. (Rice) California Inst. of Tech., Pasadena, Calif.
MICKELSON, Prof. E. L., Ph.D. (Minnesota) State Teachers Coll., Silver City, N. Mex. *1933–34, Capt. U. S. Army, Camp Jack Fleming, Pinos Altos, N. Mex.*
MIDDLEMISS, Asst. Prof. R. R., M.S. (Colorado) Washington Univ., St. Louis, Mo.
MIKESH, J. S. Lawrenceville School, Lawrenceville, N. J.
MILES, Asso. Prof. E. J., Ph.D. (Chicago) Yale Univ., New Haven, Conn. *87 Marvel Rd.*
MILES, H. J., Ph.D. (California) Instr., Univ. of Illinois, Urbana, Ill. *369 Math. Bldg.*
MILLER, A. L., Ph.D. (Harvard) Treas. and Genl. Mgr., C. N. Miller Co., Boston, Mass. *25 Clinton Rd., Brookline, Mass.*
MILLER, Prof. E. B., A.M. (Chicago) Illinois Coll., Jacksonville, Ill. *1205 W. College Ave.*
MILLER, Asst. Prof. F. H., Ph.D. (Columbia) Cooper Union, New York, N. Y. *Cooper Square*
MILLER, Prof. G. A., Ph.D. (Cumberland) Emeritus, Univ. of Illinois, Urbana, Ill. *706 W. High St.*
MILLER, G. T., M.S. (Iowa State Coll.) Instr., Purdue Univ., LaFayette, Ind. *226 S. Grant St.*

MILLER, Prof. I. L., A.M. (Indiana) South Dakota State Coll., Brookings, S. D. *724 Fourth St.*
MILLER, Prof. J. S., Sc.D. (Virginia) Emory and Henry Coll., Emory, Va.
MILLER, Prof. NORMAN, Ph.D. (Harvard) Queen's Univ., Kingston, Ont., Can.
MILLER, W. I., Ph.D. (Pittsburgh) Instr., Univ. of Pittsburgh, Pittsburgh, Pa. *722 Broad St., Sewickley, Pa.*
MILLER, Asst. Prof. W. M., Ph.D. (Illinois) Tufts Coll., Medford, Mass. *37 Chetwynd Rd., W. Somerville, Mass.*
MILLINGTON, Asst. Prof. H. G., C.E. (Rensselaer) Coll. of Eng., Univ. of Vermont, Burlington, Vt. *224 Plattsburg Ave.*
MILLS, Prof. C. N., A.M. (Indiana) Illinois State Normal Univ., Normal, Ill. *602 N. School St.*
MILNE, Prof. W. E., Ph.D. (Harvard) Head of Dept., State Agric. Coll., Corvallis, Ore. *525 N. 21st St.*
MIRICK, G R., A.M. (Michigan) Teacher, Lincoln School, Teachers Coll., New York, N. Y. *425 W. 123 St.*
MISER, NELLIE P. (Mrs. W. L.), A.B. (Huron Coll.) 1715 Ashwood Ave., Nashville, Tenn.
MISER, Prof. W. L., Ph.D. (Chicago) Vanderbilt Univ., Nashville, Tenn. *1715 Ashwood Ave.*
MISH, A. F., A.B. (West Virginia) Instr., High School, Grafton, W. Va. *Inwood, Berkele / Co., W. Va.*
MITCHELL, Asst. Prof. A. K , Ph.D. (Johns Hopkins) Trinity Coll. Hartford Conn. *Dept. of Math.*
MITCHELL, Prof. B. E., Ph.D. (Columbia) Millsaps Coll., Jackson, Miss.
MITCHELL, Prof. H. H., Ph.D. (Princeton) Univ. of Pennsylvania, Philadelphia, Pa. *College Hall*
MITCHELL, Prof. U. G., Ph.D. (Princeton) Head of Dept., Univ. of Kansas, Lawrence, Kans. *1313 Massachusetts Ave.*
MITRA, Prof. N. B., M.A. (Calcutta Univ.) Ewing Christian Coll., Allahabad City, U. P., India
MODE, Prof. E. B., A.M. (Harvard) Boston Univ., Boston, Mass. *688 Bolyston St.*
MOENCH, L. W., A.B. (Macalester) Address unknown.
MOLINA, E. C. Switching Theory Engr., Amer. Tel. and Tel. Co., New York, N. Y. *195 Broadway*
MONASTERIO, Prof. J. O., C.E. (Chapultepec Milit. Acad.) Math. and Physics, Loyola Univ., New Orleans, La.
MONTAGUE, HARRIET F., A.M. (Buffalo) Instr , Univ. of Buffalo, Buffalo, N. Y. *3425 Main St.*
MOODY, ETHEL I., Ph.D. (Cornell) Pennsylvania State Coll., State College, Pa. *112 E. Fairmount Ave.*
MOODY, Prof. W. A., A.M. (Bowdoin) Emeritus, Bowdoin Coll., Brunswick, Me. *60 Federal St.*
MOORE, Prof. C. N., Ph.D. (Harvard) Univ. of Cincinnati, Cincinnati, Ohio. *219 Woolper Ave.*
MOORE, Asso. Prof. F. C., A.B. (Dartmouth) Massachusetts Agric. Coll., Amherst, Mass.
MOORE, G. E., M.S. (Illinois) Asst., Univ. of Illinois, Urbana, Ill. *712 W. Arlington Ct., Champaign, Ill.*
MOORE, Asst. Prof. L. T., Ph.D. (Johns Hopkins) Brooklyn Coll., Brooklyn, N. Y. *205 Hicks St.*
MOORE, Prof. R. L., Ph.D. (Chicago) Pure Math., Univ. of Texas, Austin, Tex.
MOORE, T. W., Ph.D. (Yale) c/o M. O. Moore, R. D. 7, Washington, Pa.
MOORE, Prof. W. A., A.M. (Chicago) Birmingham Southern Coll., Birmingham, Ala.
MOORE, Asso. Prof. W. L., Ph.D. (Illinois) Univ. of Louisville, Louisville, Ky. *4521 S. Second St.*
MOREHOUSE, T. C. Mgr., College Dept., The Macmillan Co., New York, N. Y. *60 Fifth Ave.*
MORENO, Prof. H. C., Ph.D. (Clark) Applied Math., Stanford Univ., Stanford University, Calif. *684 Mirada Ave.*
MORENUS, Prof. EUGENIE M., Ph.D. (Columbia) Sweet Briar Coll., Sweet Briar, Va.
MORGAN, F. M., Ph.D. (Cornell) Dir., Clark School, Hanover, N. H.
MORIARTY, M. M. S., A.B. (Holy Cross) Emeritus, High School, Holyoke, Mass. *Petersham, Mass.*
MORITZ, Prof. R. E., Ph.D. (Strassburg) Univ. of Washington, Seattle, Wash.
MORLEY, Prof. R. K., Ph.D. (Clark) Worcester Poly. Inst., Worcester, Mass. *43 Laconia Rd.*
MORRILL, W. K., Ph.D. (Johns Hopkins) Instr., Johns Hopkins Univ., Baltimore, Md. *5203 Gwynn Oak Ave.*

MORRIS, Prof. C. C., A.M. (Harvard) Ohio State Univ., Columbus, Ohio
MORRIS, Prof. F. R., Ph.D. (California) State Teachers Coll., Fresno, Calif.
MORRIS, Asso. Prof. MAX, Ph.D. (Chicago) Case School of Appl. Sc., Cleveland, Ohio
MORRIS, Prof. RICHARD, Ph.D. (Cornell) Rutgers Univ., New Brunswick, N. J. *12 Johnson St.*
MORRIS, S. S., M.S. (West Virginia) Van, W. Va.
MORRISON, Sister CHARLES MARY, Ph.D. (Catholic Univ.) Prof. Head of Dept., Nazareth Coll., Louisville, Ky. *851 S. Fourth St.*
MORSE, Prof. D. S., Ph.D. (Cornell) Union Coll., Schnectady, N. Y.
MORSE, Prof. MARSTON, Ph.D. (Harvard) Harvard Univ., Cambridge, Mass.
MORSE, Prof. W. P., A.M. (Maine) Dean, Ricker Jr. Coll., Houlton Me.
MORTON, NELLIE C., A.B. (Brown) Asst. in Astr., Wellesley Coll., Wellesley, Mass.
MOSKOVITZ, Asst. Prof. DAVID, Ph.D. (Brown) Carnegie Inst. of Tech., Pittsburgh, Pa.
MOSSMAN, Asst. Prof. THIRZA A., A.M. (Chicago) State Agric. Coll., Manhattan, Kans.
MOULTON, Dean E. J., Ph.D. (Chicago) Northwestern Univ., Evanston, Ill. *1114 Colfax St.*
MOULTON, F. R., Ph.D. (Chicago) Dir., Utilities Power and Light Corp., Chicago, Ill. *327 S. LaSalle St.*
MOURAD, Lieut Commander SALIH (Turkish Navy; retired) Prof. of Physics, Govt. Eng. Coll.; Applied Math., Robert Coll., Constantinople, Turkey. *Robert College, Bebek*
MOYLE, K. E., A.M. (Bucknell) Teacher, High School, Lexington, Mass
MUEHLMAN, Rev. PAUL, A.M. (St. Louis Univ.) Asso. Prof., Univ. of Detroit, Detroit, Mich.
MUIR, Sir THOMAS, D.Sc. (Univ. of Cape Town) Late Supt.-Genl. of Educ., Cape Colony. *Elmcote, Sandown Rd., Rondebosch, S. Africa*
MULLEMEISTER, Asst. Prof. HERMANCE, Ph.D. (Utrecht, Holland) Univ. of Washington, Seattle, Wash. *Dept. of Math.*
MULLEN, Mrs. SELAH, W., B.S. (Michigan) Teacher, North East High School, Detroit, Mich. *286 E. Grand Blvd.*
MULLER, JESSIE J. (Mrs. H. J.), Ph.D. (Illinois) Univ. of Texas, Austin, Tex.
MULLINGS, M. E., Ph.D. (Cincinnati) Instr., Eng. Math., Univ. of Cincinnati, Cincinnati, Ohio. *Dept. of Math.*
MULLINS, Prof. G. W., Ph.D. (Columbia) Barnard Coll., Columbia Univ., New York, N. Y. *Barnard Coll., 119th St. and Broadway*
MUNDHJELD, SIGURD, A.B. (Concordia, Moorhead, Minn.) Instr., Waldorf Coll., Forest City, Iowa
MUNN, HUGH. Student, Univ. of New Mexico, Albuquerque, N. M. *415 W. Granite Ave.*
MUNRO, R. J., B.S. in M.E. (Iowa) Instr., Mech. Eng., Univ. of New Mexico, Albuquerque, N. M. *3416 Monte Vista Blvd.*
MUNROE, FLORENCE L., A.B. (Wellesley) Teacher, High School, Northampton, Mass. *51 Henshaw Ave.*
MURFEE, Col. W. L., A.M. (Virginia) Pres., Marion Inst., Marion, Ala.
MURNAGHAN, Prof. F. D., Ph.D. (Johns Hopkins) Applied Math., Johns Hopkins Univ., Baltimore, Md. *6202 Sycamore Rd.*
MURRAY, Prof. C. A., A.M. (Texas) Head of Dept., State Teachers Coll., Canyon, Tex.
MURRAY, Prof. D. A., Ph.D. (Johns Hopkins) Applied Math., McGill Univ., Montreal, P.Q., Can. *3653 University St.*
MURRAY, V. F., B.S. (St. Andrew's, Scotland) 542 Hudson St., Hoboken, N. J.
MURTO, Miss ARRIA, M.S. (Chicago) Teacher, High School, Carthage, Mo. *914 Howard Ave.*
MUSSELMAN, Prof. J. R., Ph.D. (Johns Hopkins) Western Reserve Univ., Cleveland, Ohio

NASH, F. P., A.M. (Columbia) Teacher, Groton School, Groton, Mass.
NASSAU, Prof. J. J., Ph.D. (Syracuse) Head of Dept. of Astr., Case School of Appl. Sc., Cleveland, Ohio
NEELLEY, Prof. J. H., Ph.D. (Yale) Carnegie Inst. of Tech., Pittsburgh, Pa. *300 Broadmoor Ave., Sunset Hills, Mt. Lebanon, Pa.*
NEFF, Prof. I. F., M.S. (Drake; Chicago) Drake Univ., Des Moines, Iowa. *2801 Brattleboro Ave.*
NEIKIRK, Asst. Prof. L. I., Ph.D. (Pennsylvania) Univ. of Washington, Seattle, Wash. *4723 21st Ave. N. E.*
NELSON, Prof. A. L., Ph.D. (Chicago) Coll. of the City of Detroit, Detroit, Mich.
NELSON, Asso. Prof. C. A., Ph.D. (Chicago) New Jersey Coll. for Women, Rutgers Univ., New Brunswick, N. J.
NELSON, POLLY P., A.M. (Chicago) Spruce Hedges, Franconia, N. H.
NELSON, W. A., A.M. (Texas) Haskell, Tex.

NELSON, Asso. Prof. W. K., M.S.; E.E. (Colorado) Eng. Math., Univ. of Colorado, Boulder, Colo. *925 Grandview Ave.*
NESS, MARIE M., A.M. (Minnesota) Research Assoc., Univ. of Minnesota, Minneapolis, Minn. *2530 Dupont Ave. S.*
NEUBAUER, Asst. Prof. GRETA, A.M. (Wyoming) Univ. of Wyoming, Laramie, Wyo. *Dept. of Math.*
NEWELL, M. J., A.M. (Michigan) Teacher, High School, Evanston, Ill. *2226 Hartzell St.*
NEWLIN, R. L., M.S. (Chicago) 125 W. Blake Ave., Columbus, Ohio
NEWSOM, Prof. C. V., Ph.D. (Michigan) Univ. of New Mexico, Albuquerque, N. Mex.
NEWSOM, MARDELLE, A.B. (Wheaton) Teacher, High School, Poplar Grove, Ill.
NEWSON, Prof. MARY W., Ph.D. (Göttingen) Eureka Coll., Eureka, Ill.
NEWTON, F. E., Ph.B. (Yale) Head of Dept., Phillips Acad., Andover, Mass. *9 Salem St.*
NEWTON, Prof. G. A., A.M. (Trinity Univ.) Head of Dept., Trinity Univ., Waxahachie, Tex.
NICHOLS, G. D., A.M. (Nebraska) Univ. of Arkansas, Fayetteville, Ark. *Dept. of Math.*
NICHOLS, Prof. I. C., Ph.D. (Michigan) Applied Math., Louisiana State Univ., Baton Rouge, La.
NICKOL, Prof. J. P., Ph.D. (Fribourg) St. Bonaventure Coll., St. Bonaventure, N. Y. *112 Niagara St., Olean, N. Y.*
NICOLET, JUSTIN, C. E. 1849 Belle Plaine Ave., Chicago, Ill.
NOBLE, Prof. C. A., Ph.D. (Göttingen) Univ. of California, Berkeley, Calif. *2224 Piedmont Ave.*
NORBERT, Brother, M.S. (Notre Dame) Instr., St. Edwards Univ., Austin, Tex.
NORDGAARD, Prof. M. A., Ph.D. (Columbia) Upsala Coll., East Orange, N. J.
NORRIS, Prof. R. E., A.M. (Illinois) State Teachers Coll., Milwaukee, Wis.
NOWLAN, Prof. F. S., Ph.D. (Chicago) Univ. of British Columbia, Vancouver, B. C.
NOWLAN, MABEL I., M.S. (Michigan) Head of Dept., Bethel Woman's Coll., Hopkinsville, Ky.
NYSWANDER, Asso. Prof. J. A., Ph.D. (Chicago) Univ. of Michigan, Ann Arbor, Mich.

OAKLEY, Asst. Prof. C. O., Ph.D. (Illinois) Brown Univ., Providence, R. I.
O'DONNELL, Rev. G A., A.M. (Woodstock; Georgetown) Grad. Student, St. Louis Univ., St. Louis, Mo. *Grand and Pine Blvds.*
OERGEL, C. T., B.S. in M.E. (Penna. State Coll.) Mech. Engr., General Elec. Co., Schenectady, N. Y. *321 Division St.*
OGLESBY, Prof. E. J., A.M. (Virginia) Eng. Math., Univ. of Virginia, University, Va. *P.O. Box 1032*
OLDENBURGER, RUFUS, M.S. (Chicago) Instr., Case School of Appl. Sc., Cleveland, Ohio. *Main 67*
OLDHAM, Asst. Prof. MABEL R., A.M. (Texas) State Coll. for Women, Denton, Tex. *Box 895, C.I.A. Sta.*
OLDS, Asso. Prof. E. G., Ph.D. (Pittsburgh) Carnegie Inst. of Tech., Pittsburgh, Pa. *953 LaClair Ave., Regent Sq.*
OLLIVIER, ARTHUR, M.S. (Iowa) 125 N. Dubuque St., Iowa City, Iowa
OLSON, EMMA J., Ph.D. (Chicago) Fairview, S. Dak.
OLSON, Asst. Prof. H. L., Ph.D. (Chicago) Michigan State Coll., East Lansing, Mich. *217 Louis St.*
O'QUINN, Asst. Prof. R. L., A.B. (Louisiana) Louisiana State Univ., Baton Rouge, La.
ORANGE, WILLIAM, A.M. (California) Chm., Math. Dept., Jr. Coll., Los Angeles, Calif. *855 N. Vermont Ave.*
ORE, Prof. OYSTEIN, Ph.D. (Oslo) Yale University, New Haven, Conn.
ORR, EUNICE C., A.M. (Indiana) Teacher, High School, Arcadia, Ind. *Scircleville, Ind.*
OSBORN, Prof. JESSE, Ph.D. (Cornell) Harris Teachers Coll., St. Louis, Mo. *3237a Lafayette Ave.*
OSGOOD, Prof. W. F., Ph.D. (Erlangen) Emeritus, Harvard Univ. *1800 Thousand Oaks Blvd., Berkeley, Calif.*
O'SHAUGHNESSY, Prof. LOUIS, Ph.D. (Pennsylvania) Applied Mech., Virginia Poly. Inst., Blacksburg, Va. *Box 177*
O'TOOLE, Prof. A. L., Ph.D. (Michigan) Mary Manse Coll., Toledo, Ohio. *2121 Madison Ave.*
OTT, Prof. W. P., Ph.D. (Chicago) Univ. of Alabama, University, Ala.
OVERMAN, Prof. J. R., Ph.D. (Michigan) Dean, Coll. of Liberal Arts, State Coll., Bowling Green, Ohio
OWENS, Prof. F. W., Ph.D. (Chicago) Head of Dept., Pennsylvania State Coll., State College, Pa. *462 E. Foster Ave.*
OWENS, HELEN B. (Mrs. F. W.), Ph.D. (Cornell) 462 E. Foster Ave., State College, Pa.

OXSHEER, Asst. Prof. LELA, A.M. (Teachers Coll., Columbia) Stephen F. Austin Teachers Coll., Nacogdoches, Tex. *516 North St.*

PAASWELL, GEORGE, C. E. (Cornell) Chief Engr., Corson Constr. Co., New York, N. Y. *45 Christopher St*

PACKER, MARGARET C., A.M. (Brown) Bell Telephone Labs., New York, N. Y., *463 West St.*

PALMIÉ, Prof. ANNA H., Ph.B. (Cornell) Emeritus Coll. for Women, Western Reserve Univ., Cleveland, Ohio. *Miami Beach, Fla.*

PARADISO, L. J., Ph.D. (Cornell) Instr., Cornell Univ., Ithaca, N. Y. *315 Utica St.*

PARK, Prof. R. S., Ph.D. (Kentucky) Eastern Teachers Coll., Richmond, Ky. *213 Burnam Ct.*

PARKER, Prof. W. P., M.A. (Emory Univ.) Union Christian Coll., Pyengyang, Korea

PARKER, Prof. W. V. Ph.D. (Brown) Mississippi Woman's Coll., Hattiesburg, Miss. *Station B*

PARKINSON, Asso. Prof. G. A., Ph.D. (Wisconsin) Chm. of Dept., Univ. of Wisconsin, Extension Div., Milwaukee, Wis. *623 W. State St.*

PARSON, S. F. Head of Dept., Northern Illinois State Teachers Coll., DeKalb, Ill. *305 College Ave.*

PARTRIDGE, E. A., Ph.D. (Pennsylvania) Head of Science Dept., West Phila. High School, Philadelphia, Pa. *48th and Walnut Sts.*

PASSANO, Asso. Prof. L. M., A.B. (Johns Hopkins) Mass. Inst. of Tech., Cambridge, Mass.

PATTEN, W. E., C.E. (Cornell) 1313 Shepherd St., South Boston, Va.

PATTERSON, Asso. Prof. B. C., Ph.D. (Johns Hopkins) Hamilton Coll., Clinton, N. Y. *College Hill*

PATTILLO, Acting Pres. N. A., Ph.D. (Johns Hopkins) Prof., Randolph-Macon Women's Coll., Lynchburg, Va.

PATTEN, BESS, M.S. (Chicago) Teacher, Girls' High School, Atlanta, Ga. *1585 N. Decatur Rd. N. E.*

PAULINUS, Brother, A.B. (Mt. St. Joseph) Address unknown

PAXTON, Asso. Prof. E. K., A.M. (Columbia) Washington and Lee Univ., Lexington, Va.

PAXTON, MARY S., A.M. (Indiana) Teacher, South Side High School, Fort Wayne, Ind. *125 E. Branning Ave.*

PAYNE, Asst. Prof. C. K., Ph.D. (New York Univ.) Washington Square Coll., New York, N. Y. *100 Washington Square E.*

PECK, ALICE A., A.M. (Duke) Registrar and Instr. in Math., Converse Coll., Spartanburg, S. C.

PECK, W. D., A.B. (Lebanon Valley) Head of Dept., Asheville School for Boys, Asheville, N. C.

PEDERSEN, Asso. Prof. F. M., Sc.D. (New York Univ.) Coll. of the City of New York, New York, N. Y. *790 Riverside Drive*

PEGRAM, Prof. ANNIE M., A.M. (Duke) Greensboro Coll., Greensboro, N. C.

PEHRSON, Prof. E. W., A.M. (California) Univ. of Utah, Salt Lake City, Utah

PELLETIER, Prof. ARTHUR. Higher Alg., École Poly., Montreal, Can. *8456 Drolet St.*

PENCE, SALLIE E., A.M. (Kentucky) Instr., Univ. of Kentucky, Lexington, Ky. *635 Maxwelton Ct.*

PENN, S. S. 3230 Cruger Ave., New York, N. Y.

PENNELL, W. O., B.S. (Mass. Inst. of Tech.) Chief Engr., So. Western Bell Tel. Co., St. Louis, Mo. *330 Oakwood Ave., Webster Groves, Mo.*

PERKINS, F. W., Ph.D. (Harvard) Instr., Dartmouth Coll., Hanover, N. H. *201 Hallgarten Hall*

PERKINS, H. A., A.M. (Wisconsin) Supervisor of Math., Hampton Inst., Hampton, Va.

PERRY, D. B., A.M. (Stanford) Chemist, Genl. Petroleum Corp., Los Angeles, Calif. *10556 Almayo Ave.*

PERRY, Asst. Prof. RUTH C., A.B. (Wellesley) Dean of Women, Univ. of Chattanooga, Chattanooga, Tenn.

PERRY, VIOLA, A.M. (Peabody) Head of Dept., S. Georgia Teachers Coll., Collegeboro, Ga.

PETERS, A. S., M.S. (New York Univ.) Instr., New York Univ., University Hts., New York, N. Y.

PETERS, J. W., Ph.D. (Johns Hopkins) Instr. Univ. of Illinois, Urbana, Ill. *360 Math. Bldg.*

PETERSON, J. K., A.M. (Harvard) 1915 Blakemore Ave., Nashville, Tenn.

PETERSON, Prof. O. J., Ph.D. (Michigan) State Teachers Coll., Emporia, Kans. *1402 Highland Pl. St.*

PETERSON, T. S., Ph.D. (Ohio State) Fellow, Inst. for Advanced Study, Princeton, N. J. *14 Spruce St.*

PETTIT, Prof. H. P., Ph.D. (Illinois) Marquette Univ., Milwaukee, Wis. *4524 N. Bartlett Ave.*
PHALEN, Provost H. R., Ph.D. (Chicago) St. Stephen's Coll., Annandale-on-Hudson, N. Y.
PHILIPS, Prof. A. W., A.M. (Chicago) State Teachers Coll., Emporia, Kans.
PIAGGIO, Prof. H. T. H., D.Sc. (London) University Coll., Nottingham, England
PIERCE, Prof. JESSE, Ph.D. (Michigan) Heidelberg Univ., Tiffin, Ohio. *138 Greenfield St.*
PIERCE, Prof. T. A., Ph.D. (California) Univ. of Nebraska, Lincoln, Nebr *1811 Pepper Ave.*
PIERPONT, Prof. JAMES, Ph.D. (Vienna) Yale Univ., New Haven, Conn. *693 Orange St.*
PIERSON, A. D., A.M. (Missouri) Jr. Coll., Kansas City, Mo. *7217 Summit St.*
PINCHERLE, Prof. SALVATORE, Sc.D. (Bologna) Univ. of Bologna, Bologna, Italy. *Viale Panzacchi 3*
PINKERTON, R. M., B.S. (Bradley Poly. Inst.) Junior Physicist, Natl. Adv. Committee for Aeronautics, Langley Field, Va.
PIRENIAN, Asst. Prof. Z. M., M.S. (Florida) Univ. of Florida, Gainesville, Fla. *Dept. of Math.*
PIXLEY, H. H., Ph.D. (Chicago) Instr., Coll. of the City of Detroit, Detroit, Mich. *4841 Cass Ave. On leave 1933–34. Math. Economist, Div. of Econ. Research and Planning, N.R.A.*, Washington, D. C.
PLANT, Prof. L. C., M.S. (Chicago) Michigan State Coll., East Lansing, Mich.
PLIMPTON, G. A., LL.D. (Rochester), L.H.D. (New York Univ.) Sr. member, Ginn & Co., New York, N. Y. *70 Fifth Ave.*
PLOENGES, Prof. E. W., A.M. (Michigan) Kansas Wesleyan Univ., Salina, Kans.
PLYMALE, Prof. R. B., A.M. (Mercer; Columbia) Dean, Bessie Tift Coll., Forsyth, Ga.
POLAN, Asst. Prof. L. R., M.S. (West Virginia) Alfred Univ., Alfred, N. Y.
POLLARD, Asst. Prof. H. S., Ph.D. (Wisconsin) Miami Univ., Oxford, Ohio *14 E. Spring St.*
POLLOCK, SAUL, Ph.D. (California) Morgan Hill, Calif.
POOLER, L. G., Ph.D. (Columbia) Physics, Hunter Coll., New York, N. Y. *456 Riverside Drive*
PORTER, Asso. Prof. C. S., A.M. (Clark) Dean, Amherst Coll., Amherst, Mass. *Box 735*
POST, E. L., Ph.D. (Columbia) Teacher, High School, New York, N. Y.
POUND, Prof. V. E., Ph.D. (Toronto) Univ. of Buffalo, Buffalo, N. Y. *190 Capen Blvd.*
POUNDER, Asso. Prof. I. R., Ph.D. (Chicago) Univ. of Toronto, Toronto, Ont., Can.
POWELL, Asst. Prof. J. E., Ph.D. (Chicago) Michigan State Coll., East Lansing, Mich. *349 Division St.*
PRETZ, PIUS S., A.M. (St. John's Univ.) St. Benedict's Coll., Atchison, Kans.
PRICE, G. B., Ph.D. (Harvard) Instr., Univ. of Rochester, Rochester, N. Y. *Coll. of Arts and Sciences*
PRICE, IRENE, Ph.D. (Indiana) Instr., State Teachers Coll., Oshkosh, Wis.
PRIDE, Asst. Prof. H. H., Ph.D. (New York Univ.) New York Univ., New York, N. Y. *University Hts.*
PRIESTER, Prof. G. C., Ph.D. (Michigan) Materials of Eng., Univ. of Minnesota, Minneapolis, Minn.
PUCKETT, W. T., Jr., M.S. (Virginia) Grad. student, Univ. of Virginia, University, Va. *1 Park Place*
PUGH, G. T., Ph.D. (Vanderbilt) Head of Dept., Winthrop Coll., Rock Hill, S. C.
PUGSLEY, Asso. Prof. D. W., M.S. (Michigan) Berea Coll., Berea, Ky. *Box 91, College P.O.*
PURCELL, E. J., Ph.D. (Cornell) Box 656, Colorado Springs, Colo.
PURDIE, Asst. Prof. K. S., B.S. (Va. Milit. Inst.) Virginia Milit. Inst., Lexington, Va.
PUTNAM, Asso. Prof. R. G., Ph.D. (Chicago) New York Univ., New York, N. Y. *On leave 1933–34. Univ. of Vienna, Austria. Armbrustergasse 35, Vienna 19*
PUTNAM, Prof. T. M., Ph.D. (Chicago) Prof. of Math. and Dean of Undergrads. Univ. of California, Berkeley, Calif.
PYKE, Prof. A. J., B.A. (Toronto) Univ. of Saskatchewan, Saskatoon, Sask., Can.

QUADE, E. S., B.S. (Florida) Brown Univ., Providence, R. I.
QUAID, L. J., B.S. (Illinois) Instr., Drawing, Univ. of Minnesota, Minneapolis, Minn. *322–18th Ave. S.E.*
QUARLES, LOUIS, A.B. (Michigan) Lines, Spooner & Quarles, Lawyers, Milwaukee, Wis. *710 N. Plankinton Ave.*
QUERFELD, D. W., A.B. (James Millikin) Clinton, Ill.
QUIGLEY, Prof. MARY J., A.B. (Radcliffe) Teachers Coll. of the City of Boston. *332 Savin Hill Ave., Dorchester, Mass.*
QUILTY, PATRICK, C. E. (Cooper Union) Instr., Cooper Union, New York, N. Y. *601 W. 163 St.*
QUINN, J. J., Ph.D. (Villanova) Address unknown

RABE, L. L., A.M. (Illinois) Instr., LaSalle-Peru-Oglesby Jr. Coll., LaSalle, Ill. *507-13th St.*
RADÒ, Prof. TIBOR, Ph.D. (Szeged) Ohio State Univ., Columbus, Ohio. *407 King St.*
RAGSDALE, Prof. VIRGINIA, Ph.D. (Bryn Mawr) North Carolina Coll. for Women, Greensboro, N. C.
RAIFORD, T. E., Ph.D. (Michigan) Instr., Univ. of Michigan, Ann Arbor, Mich. *1618 Shadford Rd.*
RAINICH, Asso. Prof. G. Y., Master in Pure Math. (Kazan) Univ. of Michigan, Ann Arbor, Mich. *602 Oswego St.*
RAINVILLE, E. D., A.B. (Colorado) Jr. Engr., Bureau of Reclamations, U. S. Dept. of Interior, Denver, Colo. *P. O. Box 1413*
RAMAGE, Judge C. J., Ph.D. (Grove City) Eleventh Judicial Circuit, Saluda, S. C.
RAMBO, Asso. Prof. SUSAN M., Ph.D. (Michigan) Smith Coll., Northampton, Mass. *12 Barrett Pl.*
RAMLER, Prof. O. J., Ph.D. (Catholic Univ.) Catholic Univ., Washington, D. C. *12 Girard St. N.E.*
RAMOS, DORA, A.M. (Columbia) Prin., High School, San German, P.R.
RAMSDELL, Prof. G. E., A.M. (Harvard) Bates Coll., Lewiston, Me. *40 Mountain Ave.*
RAMSEY, Asso. Prof. MARGARET, A.M. (Oregon) Albany Coll., Albany, Ore.
RANDALL, Prof. A. W., A.M. (Colorado) Head of Dept., Prairie View State Coll., Prairie View, Tex. *Box 63*
RANDOLPH, J. F., A.M. (Michigan) Cornell Univ., Ithaca, N. Y. *White Hall*
RANKIN, A. W. 119 S. Grant St., W. LaFayette, Ind.
RANKIN, Prof. J. M., A.M. (California) Coll. of Idaho, Caldwell, Idaho. *1810 Ash St.*
RANKIN, Prof. W. W., Jr., A.M. (North Carolina) Duke Univ., Durham, N. C.
RANSOM, Prof. W. R., A.M. (Tufts; Harvard) Tufts Coll., Tufts College, Mass. *29 Sawyer Ave.*
RANUM, Prof. ARTHUR, Ph.D. (Chicago) Cornell Univ., Ithaca, N. Y. *3 Central Ave.*
RASCHE, Prof. W. H. Mechanism, Virginia Poly. Inst., Blacksburg, Va.
RASEL, D. M., M.S. (Washington and Jefferson) Instr., Physics, Washington and Jefferson Coll., Washington, Pa.
RASMUSEN, RUTH B., M.S. (Chicago) Grad. student, Univ. of Chicago, Chicago, Ill. *Gates 72*
RASOR, E. A., M.S. (Ohio State) Asst., Actuarial Dept., Northwestern Mut. Life Ins. Co., Milwaukee, Wis. *2564 N. Terrace Ave.*
RASOR, Prof. S. E., M.S. (Chicago) Ohio State Univ., Columbus, Ohio. *1595 Neil Ave.*
RAU, Prof. A. G., Ph.D. (Lehigh) Moravian Coll., Bethlehem, Pa. *38 W. Market St.*
RAUDENBUSH, H. W., Jr., A.M. (Columbia) Instr., Columbia Univ., New York, N. Y. *Hamilton Hall*
RAWLINS, Asso. Prof. C. H., Jr., Ph.D. (Johns Hopkins) Postgrad. School, U. S. Naval Acad., Annapolis, Md. *13 Franklin St.*
RAYNOR, Asst. Prof. G. E., Ph.D. (Princeton) Lehigh Univ., Bethlehem, Pa. *729 Tenth Ave.*
REA, Asst. Prof. P. L., A.M. (Illinois) Marietta Coll., Marietta, Ohio. *On leave, Ohio State Univ., Columbus, Ohio. 47 E. Woodruff Ave.*
READ, Asst. Prof. C. B., A.M. (Princeton) Univ. of Wichita, Wichita, Kans.
REAGAN, Prof. C. A., A.M. (Kansas) Friends Univ., Wichita, Kans.
REAVES, Prof. CAROLINE M., A.M. (Oklahoma) Coker Coll., Hartsville, S. C.
REAVES, Prof. S. W., Ph.D. (Chicago) Dean of Coll. of Arts and Sc., Univ. of Oklahoma, Norman, Okla. *527 Chautauqua Ave.*
REBARKER, Prof. HERBERT, Ph.D. (Peabody) East Carolina Teachers Coll., Greenville, N. C.
RECHARD, Prof. O. H., Ph.D. (Wisconsin) Head of Dept., Univ. of Wyoming, Laramie, Wyo. *601 S. 13th St.*
RECHT, Asst. Prof. A. W., A.M. (Denver) Math. and Astr., Univ. of Denver, Denver, Colo. *2251 S. St. Paul St.*
REDDEN, Asso. Prof. J. E., M.S. (Iowa State Coll.) John Tarleton Agric. Coll., Stephenville, Tex. *Box 568*
REDDICK, Prof. H. W., Ph.D. (Columbia) Cooper Union, New York, N.Y.
REDDITT, B. H., A.M. (Johns Hopkins) Columbia, La.
REECE, Prof. R. H., A.M. (Colorado) New Mexico School of Mines, Socorro, N. Mex.
REED, Asso. Prof. F. W., Ph.D. (Virginia) Ohio Univ., Athens, Ohio
REED, Prof. L. J., Ph.D. (Pennsylvania) Biostatistics, Johns Hopkins Univ., Baltimore, Md.
REES, Asso. Prof. C. J., A.M. (Chicago) Univ. of Delaware, Newark, Del. *230 E. Main St.*
REES, Prof. E. L., C.E. (Kentucky), A.M. (Chicago) Univ. of Kentucky, Lexington, Ky. *200 University Ave.*

REES, Asst. Prof. MINA S., Ph.D. (Chicago) Hunter Coll., New York, N. Y. *2292 Loring Pl.*
REES, P. K., Ph.D. (Rice) Land Bank Appraiser, Federal Land Bank, Washington, D. C. *Center Point, Tex.*
REES, W. A., A.M. (Texas) Instr., Jr. Coll., Houston, Tex. *3025 Amherst St.*
REEVE, Prof. W. D., Ph.D. (Minnesota) Teachers Coll., Columbia Univ., New York, N. Y.
REID, Prof. L. W., Ph.D. (Göttingen) Haverford Coll., Haverford, Pa.
REID, W. T., Ph.D. (Texas) Instr., Univ. of Chicago, Chicago, Ill. *Box 37, Eckhart Hall*
REILLY, Prof. J. F., Ph.D. (Iowa) Univ. of Iowa, Iowa City, Iowa. *Room 212, Physics Bldg.*
REINSCH, Prof. B. P., Ph.D. (Illinois) Head of Dept., Southern Coll., Lakeland, Fla.
REISING, J. A. Teacher, Central High School, and Indiana Univ. Extension, Ft. Wayne, Ind. *2527 S. Harrison St.*
REMICK, Prof. B. L., Ph.M. (Cornell Coll) State Agric. Coll., Manhattan, Kans.
REYES, G. E., A.M. (Vanderbilt) Instr., School of Tech., Atlanta, Ga. *Box 67, Faculty Exchange*
REYNOLDS, Prof. C. N., Ph.D. (Harvard) West Virginia Univ., Morgantown, W. Va. *217 McLane Ave.*
REYNOLDS, Prof. J. B., Ph.D. (Moravian) Mech., Lehigh Univ., Bethlehem, Pa. *721 W. Broad St.*
REYNOLDS, LENA E., A.M. (California) Head of Dept., Jr. Coll., Fullerton, Calif.
REYNOLDS, W. F., A.B. (Johns Hopkins) Sr. Mathmatician, U. S. Coast and Geodetic Survey, Washington, D. C. *848 W. 37th St., Baltimore, Md.*
RHODES, C. E., Ph.D. (Cincinnati) Instr., Univ. of Cincinnati, Cincinnati, Ohio
RICE, ETHEL A., M.S. (Colorado) Teacher, High School, Pampa, Texas. *Box 1013*
RICE, Prof. HARRIS, A. M. (Harvard) Worcester Poly. Inst., Worcester, Mass.
RICE, J. M., E.E. (Lehigh) Exec. Engr., Curtiss Aeroplane and Motor Co., Buffalo, N. Y. *207 Colvin Ave.*
RICE, Asso. Prof. J. N., Ph.D. (Catholic Univ.) Catholic Univ., Washington, D. C. *3326 Thirteenth St. N.E.*
RICE, Asst. Prof. L. H., A.B. (Syracuse) Mass. Inst. of Tech., Cambridge, Mass.
RICHARDSON, Prof. A. V., M.A. (Cambridge) Bishops Coll., Lennoxville, P.Q., Can.
RICHARDSON, Prof. C. H., Ph.D. (Michigan) Bucknell Univ., Lewisburg, Pa.
RICHARDSON, Dean R. G. D., Ph.D. (Yale) Grad. School, Brown Univ., Providence, R. I.
RICHERT, Prof. D. H., A.M. (Colorado) Bethel Coll., Newton, Kans.
RICHESON, Asst. Prof. A. W., Ph.D. (Johns Hopkins) Univ. of Maryland, College Park, Md. *310 E. Lake Ave., Baltimore, Md.*
RICHMOND, SUSAN V., A.B. (Randolph-Macon Woman's Coll.) Teacher, Western High School, Washington, D. C. *2126 Connecticut Ave. N.W.*
RICHTMEYER, Asst. Prof. C. C., A.M. (Peabody) State Teachers Coll., Mt. Pleasant, Mich.
RICKARD, Asst. Prof. HORTENSE, A.M. (Ohio State) Ohio State Univ., Columbus, Ohio. *79 W. Beaumont Rd.*
RIDER, Asso. Prof. P. R., Ph.D. (Yale) Washington Univ., St. Louis, Mo.
RIETZ, Prof. H. L., Ph.D. (Cornell) Univ. of Iowa, Iowa City, Iowa.
RIGGS, Prof. N. C., M.S. (Harvard) Mech., Carnegie Inst. of Tech., Pittsburgh, Pa.
RISSELMAN, Prof. W. C., Ph.D. (Minnesota) Northern Arizona Teachers Coll., Flagstaff, *Ariz.*
RITT, Prof. J. F., Ph.D. (Columbia) Columbia Univ., New York, N. Y. *Dept. of Math.*
ROBB, D. L., A.M. (Pittsburgh) 403 Federal St., Butler, Pa.
ROBB, J. M., A.M. (Michigan) Head of Dept., Jr. Coll., Taft, Calif. *727 San Emidio St.*
ROBBINS, ALICE V., Ph.M. (Chicago) Teacher, State Teachers Coll., Mankato, Minn. *418 S. Fourth St.*
ROBBINS, Asst. Prof. C. K., A.M. (Harvard) Purdue Univ., W. LaFayette, Ind. *418 Vine St.*
ROBERTS, Prof. B. D., Ph.D. (Iowa) New Mexico Normal Univ., Las Vegas, N. Mex. *1213 Sixth St.*
ROBERTS, Asst. Prof. J. H., Ph.D. (Texas) Duke Univ., Durham, N. C. *Box 4708*
ROBERTS, Prof. MARIA M., B. L. (Iowa State Coll.) Prof. of Math. and Senior Dean, Iowa State Coll., Ames, Iowa.
ROBERTSON, FRED, A.M. (Indiana) Instr., Iowa State Coll., Ames, Iowa. *Dept. of Math.*
ROBINSON, Asst. Prof. A. J., M.S. (Emory) Alabama Poly. Inst., Auburn, Ala.
ROBINSON, G. EDNA, A.M. (Missouri) 1507 Windsor St., Columbia, Mo.
ROBINSON, Prof. H. A., Ph.D. (Johns Hopkins) Agnes Scott Coll., Decatur, Ga. *123 College Pl.*
ROBINSON, L. V., Ph.D. (Harvard) Astronomer, Harvard Coll. Observ., Cambridge, Mass.
ROBINSON, ROBIN, Ph.D. (Harvard) Instr., Dartmouth Coll., Hanover, N. H. *21 Prospect St.*

ROBINSON, FLORA EATON (Mrs. W. F.), A.M. (North Carolina) Head of Dept., Mars Hill Coll., Mars. Hill, N. C.
ROBINSON, Prof. W. H., A.M. (Boston) Tillotson Coll., Austin, Tex. *Dept. of Math.*
RODGERS, SARAH H. (Mrs. ERIC), A.M. (Alabama) Instr., Univ. of Alabama, University, Ala.
RODGERS, Dean T. G., A.M. (Wisconsin) New Mexico Normal Univ., Las Vegas, N. Mex. *1018 Fourth St.*
ROESER, H. M., M.S. (George Washington) Engr., Physicist, U. S. Bureau of Standards, Chicago, Ill. *5800 W. 69th St., Clearing Sta.*
ROEVER, Prof. W. H., Ph.D. (Harvard) Pure Math., Washington Univ., St. Louis, Mo.
ROGERS, Asst. Prof. H. P., A.M. (Illinois) Kent State Coll., Kent, Ohio
ROGERS, Dean J. C., A.M. (Columbia) Piedmont Coll., Demorest, Ga.
ROMAN, Asst. Prof. IRWIN, Ph.D. (Chicago) Math. and Physics, Michigan Coll. of Mining and Tech., Houghton, Mich. *Hubbell Hall*
ROOD, A. A. Student, Hobart Coll., Geneva, N. Y.
ROOD, MARION B., M.S. (Michigan) 1014 Church St., Ann Arbor, Mich.
ROOS, C. F., Ph.D. (Rice) N.R.A., Room 3051, Commerce Bldg., Washington, D. C.
ROOT, Prof. R. E., Ph.D. (Chicago) Math. and Mech., Postgrad. School, U. S. Naval Acad., Annapolis, Md. *7 Franklin St.*
ROOTS, Prof. Y. K., M.S. (New York Univ.) Math. and Physics, Findlay Coll., Findlay, Ohio
ROSE, J. H., Ph.B. (Wisconsin) Asst., Univ. of Wisconsin, Madison, Wis. *17 S. Bassett St.*
ROSEBRUGH, Prof. T. R., M.A. (Toronto) Elec. Eng., Univ. of Toronto, Toronto, Ont., Can. *92 Walmer Rd.*
ROSENBACH, Asso. Prof. J. B., M.S. (Illinois) Carnegie Inst. of Tech., Pittsburgh, Pa. *2550 Beechwood Blvd.*
ROSENBAUM, JOSEPH, Ph.D. (Cornell) Instr., The Milford School, Milford, Conn.
ROSENGARTEN, Asst. Prof. GEORGE, Ph.D. (Pennsylvania) Philadelphia Coll. of Pharmacy and Sc., Philadelphia, Pa. *1105 Edgewood Rd., Brookline, Del. Co., Pa.*
ROSINGER, K. E., Ph.D. (Harvard) Instr., Columbia Univ., New York, N. Y.
ROSSKOPF, M. F., A.M. (Minnesota) Instr., Brown Univ., Providence, R. I.
ROTH, Asst. Prof. W. E., Ph.D. (Wisconsin) Univ. of Wisconsin, Extension Div., Milwaukee, Wis. *623 W. State St.*
ROTHERMEL, FLORENCE. Teacher, W. Philadelphia High School, Philadelphia, Pa. *320 S. 42nd St.*
ROTHROCK, Prof. D. A., Ph.D. (Leipzig) Dean of Coll. of Liberal Arts, Indiana Univ., Bloomington, Ind. *1000 Atwater Ave.*
ROULTON, J. A. Consulting Engr., H. F. Sanville Associates, Philadelphia, Pa. *1700 S. 60th St.*
ROUSE, Asst. Prof. L. J., Ph.D. (Michigan) Univ. of Michigan, Ann Arbor, Mich.
ROWE, Prof. C. H., M.A. (Dublin) Univ. of Dublin, Dublin, Ireland. *38 Trinity College*
ROWE, J. E., Ph.D. (Johns Hopkins) 3434 University Pl., Baltimore, Md.
ROWLAND, Prof. S. A. Ohio Wesleyan Univ., Delaware, Ohio. *49 Oak Hill Ave.*
RUDERMAN, H. D., A.M. (Columbia) Teacher, James Madison High School, Brooklyn, N. Y. *718 Avenue P*
RUMNEY, ETHEL A., M.S. (Chicago) 309 N. Main St., Sandwich, Ill.
RUMSEY, MARY B., A.M. (Illinois) Asst., Univ. of Illinois, Urbana, Ill. *Univ. Sta.*
RUNGE, Asst. Prof. LULU L., A.M. (Wisconsin) Univ. of Nebraska, Lincoln, Nebr.
RUNNING, Prof. T. R., Ph.D. (Wisconsin) Univ. of Michigan, Ann Arbor, Mich. *1019 Michigan Ave.*
RUPP, Asso. Prof. C. A., Ph.D. (Chicago) Pennsylvania State Coll., State College, Pa.
RUSK, EVELYN T. C. (Mrs. W. S.), Ph.D. (Cornell) Asso. Prof., Wells Coll., Aurora, N. Y.
RUSK, Prof. W. J., M.A. (Toronto) Math. and Astr., Grinnell Coll., Grinnell, Iowa. *1415 Park St.*
RUSSELL, Asso. Prof. BEULAH, A.M. (Chicago) Coll. of William and Mary, Williamsburg, Va.
RUTLEDGE, Asso. Prof. GEORGE, Ph.D. (Illinois) Mass. Inst. of Tech., Cambridge, Mass. *29 Bellevue Rd., Belmont, Mass.*
RYAN, MARGARET M., A.M. (Syracuse) Grad. Asst., Syracuse Univ., Syracuse, N.Y. *415 Bryant Ave.*

SABIN, MARY, S., A.M. (Denver) 1311 York St., Denver, Colo.
SAFFORD, Prof. F. H., Ph.D. (Harvard) Univ. of Pennsylvania, Philadelphia, Pa. *College Hall*
SAIBEL, Asst. Prof. E. A., Ph.D. (Mass. Inst. of Tech.) Mech., Carnegie Inst. of Tech., Pittsburgh, Pa.

SALAS-EDWARDS, Prof. RAMON. Dynamics, Univ. of Chile, Santiago, Chile. *Delicias 1876*
SALKOVER, Asst. Prof. MEYER, Ph.D. (Yale) Univ. of Cincinnati, Cincinnati, Ohio
SALVOSA, Prof. L. R., Ph.D. (Michigan) Forest Eng., Univ. of the Philippines, Manila, P. I.
SANCHEZ-DIAZ, Asst. Prof. RAFAEL, A.M. (Texas) Coll. of Agric. and Mech. Arts, Univ. of Porto Rico, Mayaguez, P. R. *On leave 1933–34. 2333 College Ave., Berkeley, Calif.*
SANDERS, Prof. S. T., M.S. (Chicago) Louisiana State Univ., Baton Rouge, La. *Box 1322*
SANFORD, VERA, Ph.D. (Columbia) Instr., State Normal School, Oneonta, N. Y. *725 W. State St., Trenton, N. J.*
SANGER, R. G., Ph.D. (Chicago) Instr., Univ. of Chicago, Chicago, Ill. *116 S. Grove Ave., Oak Park, Ill.*
SAUNDERS, FAITH, A.M. (Missouri) Maysville, DeKalb Co., Mo.
SAUREL, Prof. PAUL, Sc.D. (Bordeaux) Coll. of the City of New York. *72 Avenue d'Jena, Paris (16e), France*
SAUTÉ, Asst. Prof. GEORGE, A.M. (Brown) Cleveland Coll., Cleveland, Ohio. *103 Walnut St., Chagrin Falls, Ohio*
SAVARY, C. M., C.E. Chief of Geodesy and Cartography, Dept. of Lands and Forests, Quebec, P. Q., Can. *586 St. Foye Rd.*
SCAMMON, Prof. R. E., Ph.D. (Harvard) Dean of Medical Sciences and Prof. of Anatomy, Univ. of Minnesota, Minneapolis, Minn.
SCARBOROUGH, Asso. Prof. J. B., Ph.D. (Johns Hopkins) U. S. Naval Acad., Annapolis, Md. *P.O. Box 332*
SCARBOROUGH, Prof. J. H., Ph.D. (Vanderbilt) State Teachers Coll., Warrensburg, Mo.
SCHEIER, Rev. M. A., A.M. (St. Bonaventure) Grad. student, Catholic Univ., Washington, D. C. *Holy Name Coll., 16th and Shepherd Sts. N.E.*
SCHELKUNOFF, S. A., Ph.D. (Columbia) Research mathematician, Bell Telephone Labs., New York, N. Y. *463 West St.*
SCHEY, OLE, B.S. (Minnesota) Teacher, High School, Gilbert, Minn.
SCHLAUCH, Asst. Prof. W. S., A.M. (Columbia) Acctg., School of Commerce, New York Univ., New York, N. Y. *219 Division Ave., Hasbrouck Hts., N. J.*
SCHMEISER, MABEL F., Ph.D. (Ohio State) Inst. for Advanced Study, Princeton, N. J. *159 Nassau St.*
SCHMELLNER, N. H., M.S. (New York Univ.) 1818-79th St., Brooklyn, N. Y.
SCHNELL, L. J., B.S. in E.E. (Colorado) Instr. and Acting Head of Dept., Augsburg Coll., Minneapolis, Minn. *8th St. and 21st Ave. S.*
SCHNEPP, Prof. R. F., Ph.D. (Fribourg) Head of Dept., St. Mary's Univ., San Antonio, Tex.
SCHOENBERG, I. J., Ph.D. (Jassy) Asst., Univ. of Jassy, Jassy, Rumania. *Inst. for Advanced Study, Princeton, N. J.*
SCHOONMAKER, Prof. HAZEL E., Ph.D. (Cornell) Hartwick Coll., Oneonta, N. Y.
SCHORLING, Asso. Prof. RALEIGH, Ph.D. (Michigan) School of Educ., Univ. of Michigan, Ann Arbor, Mich.
SCHREIBER, Asso. Prof. E. W., A.M. (Chicago) State Teachers Coll., Macomb, Ill. *425 E. Calhoun St.*
SCHUB, PINCUS, Ph.D. (Dropsie) Teacher, Gratz Coll., New York, N. Y.
SCHUG, H. L., B.S. in E.E. (Lafayette) Research Engr., The Hoover Co., N. Canton, Ohio
SCHULTZ, N. L., A.B. (Maine) Grad. student, Princeton Univ., Princeton, N. J. *186 Graduate Coll.*
SCHUYLER, ELMER, M.S. (Lafayette) Chm. of Dept., Bay Ridge High School, Brooklyn, N. Y. *6676 Sedgwick Pl.*
SCHWEITZER, A. R., Ph.D. (Chicago) 452 Oakdale Ave., Chicago, Ill.
SCOTT, Asst. Prof. T. P., A.M. (Mississippi) Univ. of Mississippi, University, Miss.
SEARCY, Asst. Prof. C. L., C.E. (Purdue), A.M. (California) Univ. of Nevada, Reno, Nev.
SEARCY, Asso. Prof. H. C., Jr., A.M. (So. Methodist) Jr. Coll., Edinburg, Texas. *Box 1032*
SEELY, CAROLINE E., Ph.D. (Columbia) 501 West 116th St., New York, N. Y.
SEIDEL, WLADIMIR, Ph.D. (Munich) Instr., Harvard Univ., Cambridge, Mass. *30 Mount Auburn St.*
SEIDLIN, Prof. JOSEPH, Ph.D. (Columbia) Alfred Univ., Alfred, N. Y.
SELLEW, Prof. G. T., Ph.D. (Yale) Emeritus, Knox Coll., Galesburg, Ill. *833 N. Academy St.*
SENSENIG, WAYNE, Ph.D. (Pennsylvania) 309 Bangor Rd., Bala-Cynwyd, Mont. Co., Pa.
SEUBERT, G. A., B.S. (Pittsburgh) 309 Weldon St., Latrobe, Pa.
SHAUB, Asst. Prof. H. C., Ph.D. (Cornell) Washington and Jefferson Coll., Washington, Pa. *440 E. Beau St.*
SHAW, Asst. Prof. A. A., Ph.D. (California) Univ. of Arizona, Tucson, Ariz.
SHAW, R. S., A.M. (Columbia) Physics, Coll. of the City of New York, New York, N. Y.
SHEFFER, Asso. Prof. I. M., Ph.D. (Harvard) Pennsylvania State Coll., State College, Pa. *131 W. Park Ave.*

SHELDON, Prof. E. W., Ph.D. (Yale) Univ. of Alberta, Edmonton South, Alta., Can.
SHELLENBARGER, R..C., A.M. (Michigan) Head of Dept., Jr. Coll., Bay City, Mich. *248 N. Grant St.*
SHENTON, Prof. W. F., Ph.D. (Johns Hopkins) American Univ., Washington, D. C. *3605 Porter St. N.W.*
SHERER, C. R., A.M. (Nebraska) Head of Dept., Texas Christian Univ., Fort Worth, Tex.
SHERWOOD, Prof. G. E. F., Ph.D. (Chicago) Univ. of California at Los Angeles, Los Angeles, Calif. *920 Hyperion Ave.*
SHEWHART, W. A., Ph.D. (California) Engineer, Bell Telephone Labs., New York, N. Y. *158 Lake Drive, Mountain Lakes, N. J.*
SHIBLI, Asst. Prof. JABIR, Ph.D. (Columbia) Pennsylvania State Coll., State College, Pa. *219 W. Fairmount Ave.*
SHIRK, Prof. J. A. G., M.S. (Kansas) Head of Dept., State Teachers Coll., Pittsburg, Kans. *116 E. Lindberg Ave.*
SHIVELY, Prof. C. S., Ph.D. (Denver) Juniata Coll., Huntingdon, Pa.
SHIVELY, Prof. L. S., Ph.D. (Chicago) Ball Teachers Coll., Muncie, Ind. *407 Riverside Ave.*
SHOHAT, Asst. Prof. J. A., Ph.D. (St. Petersburg) Univ. of Pennsylvania, Philadelphia, Pa. *R 308, Bennett Hall*
SHOOK, Asst. Prof. C. A., Ph.D. (Johns Hopkins) Lehigh Univ., Bethlehem, Pa. *630 Centre St.*
SHORT, Pres. C. A., M.S. (Delaware) Wesley Collegiate Inst., Dover, Del.
SHORT, Prof. W. T., A.B. (Okla. Baptist Coll.) Head of Dept., Oklahoma Baptist Coll., Shawnee, Okla.
SHOVER, C. GRACE, Ph.D. (Ohio State) 414 S. Wayne Ave., Columbus, Ohio
SHOWMAN, H. M., A.M. (Harvard) Lecturer and Registrar, Univ. of California at Los Angeles, Los Angeles, Calif. *912 Hyperion Ave.*
SHRINER, W. O., Ph.D. (Michigan) Head of Dept., State Teachers Coll., Terre Haute, Ind.
SHUMAN, J. W., B.S. (Mass. Inst. of Tech.) Secy-Treas., Power Eng. Co.; Consulting Engr.; Minneapolis, Minn. *716 Metropolitan Life Bldg.*
SHUMWAY, Asso. Prof. R. R., A.B. (Minnesota) Univ. of Minnesota, Minneapolis, Minn.
SHUSTER, Prof. C. N., A.M. (Columbia) State Teachers Coll., Trenton, N. J.
SICELOFF, Asso. Prof. L. P., Ph.D. (Columbia) Columbia Univ., New York, N. Y.
SILVERMAN, Prof. L. L., Ph.D. (Missouri) Dartmouth Coll., Hanover, N. H.
SIMESTER, Asst. Prof. J. H., M.A. (Toronto) Univ. of Louisville, Louisville, Ky.
SIMMONS, Asso. Prof. H. A., Ph.D. (Chicago) Northwestern Univ., Evanston, Ill. *2257 Ridge Ave.*
SIMON, Prof. W. G., Ph.D. (Chicago) Adelbert Coll., Western Reserve Univ., Cleveland, Ohio
SIMONS, Prof. LAO G., Ph.D. (Columbia) Hunter Coll., New York, N. Y. *180 W. 88th St.*
SIMPSON, Prof. T. M., Ph.D. (Wisconsin) Univ. of Florida, Gainesville, Fla. *547 S. Ninth St.*
SIMPSON, Prof. T. McN., Jr., Ph.D. (Chicago) Randolph-Macon Coll., Ashland, Va.
SINCLAIR, Prof. MARY EMILY, Ph.D. (Chicago) Oberlin Coll., Oberlin, Ohio. *260 Oak St.*
SINGER, Prof. S. A., A.M. (Capital) Capital Univ., Columbus, Ohio. *2322 E. Main St.*
SIROKY, Asso. Prof. EDMOND, M.S. (Washington Univ.) Washington Univ., St. Louis, Mo.
SISAM, Prof. C. H., Ph.D. (Cornell) Colorado Coll., Colorado Springs, Colo. *816 N. Weber St.*
SKARSTEDT, Prof. MARCUS, Ph.D. (California) Whittier Coll., Whittier, Calif.
SKELDING, A. Z., A.B. (C.C.N.Y.) Asst. Actuary, Natl. Council on Compensation Ins., New York, N. Y. *116 Stanton Ave., Baldwin, N. Y.*
SKILES, Dean W. V., A.M. (Harvard) Georgia School of Tech., Atlanta, Ga.
SKINNER, Prof. E. B., Ph.D. (Chicago) Univ. of Wisconsin, Madison, Wis. *210 Lathrop St.*
SKOFIELD, L. M. 3 Lee St., Reading, Mass.
SLAUGHT, Prof. H. E., Ph.D. (Chicago) Emeritus, Univ. of Chicago, Chicago, Ill.
SLEIGHT, Prof. E. R., A.M. (Albion) Albion Coll., Albion, Mich.
SLOBIN, Prof. H. L., Ph.D. (Clark) Dean, Grad. School, Univ. of New Hampshire, Durham, N. H.
SMAIL, Prof. L. L., Ph.D. (Columbia) Lehigh Univ., Bethlehem, Pa.
SMILEY, Asst. Prof. C. H., Ph.D. (California) Brown Univ., Providence, R. I.
SMITH, Prof. A. W., Ph.D. (Chicago) Colgate Univ., Hamilton, N. Y.
SMITH, Prof. C. D., Ph.D. (Iowa) Head of Dept., Mississippi State Coll., State College, Miss.
SMITH, Asst. Prof. C. E., A.M. (Swarthmore) Math. and Astr., State Teachers Coll., Fresno, Calif.
SMITH, Prof. CLARA E., Ph.D. (Yale) Wellesley Coll., Wellesley, Mass. *14 Waban St.*

SMITH, Mrs. CONSTANCE F., A.M. (Arizona) Pima Co. School Supt., Tucson, Ariz. *Route 2, Box 653*
SMITH, C. W., A.B. (Minnesota) State Teachers Coll., Superior, Wis.
SMITH, Prof. DAVID EUGENE, Ph.D., LL.D. (Syracuse) Emeritus, Columbia Univ., New York, N.Y. *501 W. 120th St.*
SMITH, Prof. D. M., Ph.D. (Chicago) Georgia School of Tech., Atlanta, Ga.
SMITH, Prof. EDWIN R., Ph.D. (Munich) Head of Dept., Iowa State Coll., Ames, Iowa
SMITH, Prof. ELMER R., A.M. (Vanderbilt) Secy. to the Faculty, State Coll. for Women, Tallahassee, Fla. *79 College Ave.*
SMITH, Prof. E. S., Ph.D. (Virginia) Univ. of Cincinnati, Cincinnati, Ohio
SMITH, F. E., Ph.D. (Catholic Univ.) Instr., Brooklyn Coll., Brooklyn, N. Y. *Box 212, Wortendyke, N. J.*
SMITH, GENEVA M., A.B. (Maine) Head of Dept., Plymouth Normal School, Plymouth, N. H.
SMITH, Asso. Prof. G. W., Ph.D. (Illinois) Univ. of Kansas, Lawrence, Kans. *1730 Illinois St.*
SMITH, Asso. Prof. H. L., Ph.D. (Chicago) Louisiana State Univ., Baton Rouge, La.
SMITH, Asst. Prof. H. W., M.S. (Chicago) Oklahoma A. and M. Coll., Stillwater, Okla.
SMITH, Prof. I. W., A.M. (Illinois) North Dakota Agric. Coll., Fargo, N. D. *1126 13th St. N.*
SMITH, Rev. J. P., A.M. (Woodstock) Asst. Prof., St. Peters Coll., Jersey City, N. J. *144 Grand St.*
SMITH, Prof. L. W., Ph.D. (Washington and Lee) Washington and Lee Univ., Lexington, Va. *P.O. Box 744*
SMITH, Prof. MARTHA L., M.S. (Chicago) Dean of Women, Hartshorne Coll., Virginia Union Univ., Richmond, Va.
SMITH, Prof. P. F., Ph.D. (Yale) Yale Univ., New Haven, Conn. *Yale P. O. Drawer 1905A*
SMITH, P. K., Ph.D. (Illinois) Acting Head of Dept., Louisiana Poly. Inst., Ruston, La.
SMITH, R. E. Student, Allegheny Coll., Meadville, Pa. *35 Caflisch Hall*
SMITH, Asst. Prof. R. F., M.S. (New York Univ.) Coll. of the City of New York, New York N. Y. *463 W. 144th St.*
SMITH, R. R., A.B. (Yale) Publisher, New York, N. Y. *12 E. 41st St.*
SMITH, S. J., A.M. (Pittsburgh) Instr., State Teachers Coll., Lock Haven, Pa.
SMITH, Asst. Prof. W. F., A.M. (Kentucky) New River State Coll., Montgomery, W. Va. *615 First Ave.*
SMITH, Prof. W. M., Ph.D. (Columbia) Lafayette Coll., Easton, Pa.
SMYTH, Sister M. PAULINE, Ph.D. (St. Bonaventure) Instr., Aquinas Inst., Rochester, N. Y. *1127 Dewey Ave.*
SMYTH, RUTH B. (Mrs. B. J.), A.M. (Oberlin) Instr., part-time, Oberlin Coll., Oberlin, Ohio *273 Morgan St.*
SNEDECOR, Asso. Prof. G. W., A.M. (Michigan) Physics, Iowa State Coll., Ames, Iowa. *807 Hodge Ave.*
SNYDER, Asso. Prof. A. D., A.M. (Wisconsin) Union Coll., Schenectady, N. Y. *1592 Union St.*
SNYDER, Prof. VIRGIL, Ph.D. (Göttingen) Cornell Univ., Ithaca, N. Y. *214 University Ave.*
SOKOLNIKOFF, Asst. Prof. I. S., Ph.D. (Wisconsin) Univ. of Wisconsin, Madison, Wis. *Dept. of Math.*
SOLUM, Asst. Prof. A. K., A.B. (St. Olaf) St. Olaf Coll., Northfield, Minn. *307 Manitou St.*
SOUSLEY, Prof. C. P., Ph.D. (Johns Hopkins) Rose Poly. Inst., Terre Haute, Ind. *92 Potomac St.*
SPANN, Prof. J. T., B.S. (Mississippi) Univ. of Maryland, College Park, Md.
SPARKS, Prof. F. W., Ph.D. (Chicago) Texas Tech. Coll., Lubbock, Tex. *Box 94, Tech. Sta.*
SPARROW, Prof. C. M., Ph.D. (Johns Hopkins) Physics, Univ. of Virginia, University, Va.
SPEAR, Prof. JOSEPH, A.M. (Boston) Chm. of Dept., Northeastern Univ., Boston, Mass. *316 Huntington Ave.*
SPEEKER, Asso. Prof. G. G., A.M. (Indiana) Michigan State Coll., East Lansing, Mich.
SPENCELEY, Asso. Prof. G. W., A.M. (Harvard) Miami Univ., Oxford, Ohio. *100 E. Walnut St.*
SPENCER, Prof. MARY C., M.S. (Cornell) Emeritus, Newcomb Coll., New Orleans, La. *1111 Lowerline St.*
SPENCER, VIVIAN E., A.M. (Oberlin) Fellow, Univ. of Pennsylvania, Philadelphia, Pa. *Dept. of Math.*
SPENCER, W. A., B.S. (Nebraska) Instr., Armour Inst. of Tech., Chicago, Ill.
SPERRY, MAY J., A.M. (Brown) Bay Ridge, R. F. D. East Greenwich, R. I.
SPINKS, M. J. Chief Engr., Champion Bridge Co. Wilmington, Ohio. *Box 594*
SPOONER, Prof. C. C., A.M. (Amherst) State Teachers Coll., Marquette, Mich. *210 E. Prospect St.*

SROMOVSKY, Rev. R. A., A.M. (Wisconsin) Instr., St. Norbert Coll., West DePere, Wis.
STABLER, E. R., A.M. (Harvard) Grad. student, Harvard Univ., Cambridge, Mass. *201 Sycamore St., Waverley, Mass.*
STAFFORD, ANNA A., Ph.D. (Chicago) Teacher, St. John Baptist School, Mendham, N. J.
STAGER, H. W., Ph.D. (California) 565 Hamilton Ave., Palo Alto, Calif.
STAGNER, MARGUERITE E., B.S. (Iowa State Coll.) 1203 Wilson Ave., Ames, Iowa
STALEY, Asst. Prof. R. C., A.M. (Colorado) Univ. of North Dakota, Grand Forks, N. D. *2108 University Ave.*
STANWICK, C. A., B.S. in E.E. (Washington) Elec. Engr., 33 Beech St., East Orange, N. J.
STARK, Asst. Prof. MARION E., Ph.D. (Chicago) Wellesley Coll., Wellesley, Mass. *Wilder Hall*
STARRETT, A. L., A.M. (Harvard) Grad. student, Harvard Univ., Cambridge, Mass. *73 Perkins Hall*
STAUFFER, J. R. K., M.S. (Chicago) 404 Lindbergh Ave., Laurel, Del.
STAYER, Asst. Prof. J. C., A.B. (Juniata) Juniata Coll., Huntington, Pa. *310-17th St.*
STEED, Asso. Prof. D. V., Ph.D. (California) Univ. of Southern California, Los Angeles, Calif. *1733 W. 80th St.*
STELSON, Asso. Prof. H. E., Ph.D. (Iowa) Kent State Coll., Kent, Ohio
STEPHENS, Asst. Prof. EUGENE, M.S. (Washington Univ.) Washington Univ., St. Louis, Mo. *7031A Tulane Ave., University City, Mo.*
STEPHENS, Asst. Prof. JESSICA Y. (Mrs. EUGENE), Ph.D. (California) Washington Univ., St. Louis, Mo. *7031A Tulane Ave., University City, Mo.*
STEPHENS, R. C., Ph.D. (Iowa) Instr., Knox Coll., Galesburg, Ill.
STEPHENS, Prof. R. P., Ph.D. (Johns Hopkins) Dean of Grad. School., Univ. of Georgia, Athens, Ga.
STETSON, Prof. J. M., Ph.D. (Yale) Coll. of William and Mary, Williamsburg, Va.
STEVENS, W. R., A.B. (George Washington) Meteorologist, U. S. Weather Bureau, Washington, D. C.
STEVENSON, Prof. GUY, Ph.D. (Illinois) Univ. of Louisville, Louisville, Ky.
STEWART, J. K., M.S. (West Virginia) Instr., West Virginia Univ., Morgantown, W. Va.
STOKES, ELLEN C., A.M. (Brown) Instr., State Coll. for Teachers, Albany, N. Y. *11 South Lake Ave.*
STONE, Asso. Prof. R. B., A.M. (Harvard) Purdue Univ., West LaFayette, Ind. *615 Russell St.*
STOUFFER, Prof. E. B., Ph.D. (Illinois) Univ. of Kansas, Lawrence, Kans. *1019 Maine St.*
STOUT, C. E., A.M. (Wisconsin) Head of Dept., Genl. Motors Inst. of Tech., Flint, Mich. *1917 Monteith St.*
STOWELL, Prof. C. J., Ph.D. (Illinois) McKendree Coll., Lebanon, Ill.
STRANE, A. J., E. Mines (Minnesota) Head of Dept., Jr. College, Duluth, Minn. *1924 E. Superior St.*
STRATTON, Prof. W. T., Ph.D. (Washington) State Agric Coll., Manhattan, Kans.
STREATOR, G. W., A.M. (Western Reserve) Bus. Mgr., *The Crisis*, 69 Fifth Ave., New York, N. Y.
STREET, R. E., B.S. (Rensselaer) Grad. student, Harvard Univ., Cambridge, Mass. *86 Perkins Hall*
STREETMAN, FLORA M., A.M. (Rice) 2616 Louisiana St., Houston, Tex.
STROM, Prof. C. W., Ph.D. (Illinois) Luther Coll., Decorah, Iowa
STRONG, Prof. CORA, A.M. (Michigan) Woman's Coll., Univ. of North Carolina, Greensboro, N. C. *109 Adams St.*
SUFFA, Prof. MARY C., A.M. (Brown) Elmira Coll., Elmira, N. Y.
SULLIVAN, Sister M. HELEN, A.M. (Catholic Univ.) Teacher, Mt. St. Scholastica Coll., Atchison, Kans. *On leave 1933–34, Sisters Coll., Brookland, D. C.*
SULLIVAN, RUSSELL, A.B. (Yale) Astronomer, 1431 N. Meridian St., Indianapolis, Ind.
SWANSON, A. G., A.M. (Nebraska) 114 N. Thayer Ave., Ann Arbor, Mich.
SWARTZEL, Prof. K. D., M.S. (Ohio State) Head of Dept., Univ. of Pittsburgh, Pittsburgh, Pa.
SWEAZEY, Prof. G. B., A.M. (Wabash) Physics and Applied Math., Westminster Coll., Fulton, Mo.
SWEET, H. L., A.B. (Amherst) Instr., Phillips Exeter Acad., Exeter, N. H.
SWIFT, Prof. ELIJAH, Ph.D. (Göttingen) Univ. of Vermont, Burlington, Vt. *415 S. Willard St.*
SYNGE, Prof. J. L., Sc.D. (Dublin) Univ. of Toronto, Toronto, Ont., Can.

TABER, G. H. 4114 Bigelow Blvd., Pittsburgh, Pa.
TALIAFERRO, Prof. CARRIE B., A.M. (Columbia) State Teachers Coll., Farmville, Va.
TALIAFERRO, Prof. T. H., Ph.D. (Johns Hopkins) Dean, Coll. of Arts and Sciences, Univ. of Maryland, College Park, Md.

TAMARKIN, Prof. J. D., M.A.M. (St. Petersburg) Brown Univ., Providence, R. I.
TANGJERD, H. I., A.B. (St. Olaf Coll.) Instr., Itasca Jr. Coll., Coleraine, Minn.
TANZOLA, J. J., A.M. (Columbia) Instr., Cooper Union, New York, N. Y. *2041 Watson Ave., Bronx*
TAPPAN, Prof. A. HELEN, Ph.D. (Cornell) Dean of Women, Western Coll., Oxford, Ohio
TARAZI, S. R., A.B. (Cairo, Egypt) Teacher, Friends' Boys' School, Ramallah, Palestine.
TARTLER, ALEXANDER, Ph.D. (Pennsylvania) Instr., Drexel Inst., Philadelphia, Pa. *32nd and Chestnut Sts.*
TATE, JENNIE L., A.M. (WISCONSIN) Head of Dept., McMurry Coll., Abilene, Tex.
TAYLOR, Prof. E. H., Ph.D. (Harvard) Acting Pres., State Teachers Coll., Charleston, Ill.
TAYLOR, Asst. Prof. F. J., A.B. (St. Thomas) Coll. of St. Thomas, St. Paul, Minn.
TAYLOR, Prof. J. H., Ph.D. (Chicago) George Washington Univ., Washington, D. C.
TAYLOR, Prof. J. S., Ph.D. (California) Univ. of Pittsburgh, Pittsburgh, Pa. *103 Alumni Hall*
TAYLOR, Prof. MILDRED E., Ph.D. (Illinois) Head of Dept., Mary Baldwin Coll., Staunton, Va.
TAYLOR, Prof. W. E., Ph.D. (Syracuse) Syracuse Univ., Syracuse, N. Y. *822 Irving Ave.*
TAYLOR, Prof. W. H., Ph.D. (Iowa) Address unknown
TEACH, Asso. Prof. V. B., M.S. (Ohio State) Armour Inst. of Tech., Chicago, Ill. *8132 Drexel Ave.*
THÉBAULT, V. Inspecteur d'assurances, Le Mans, France. *50, rue de Wagram*
THEOBALD, Prof. JOHN, A.B. (Columbia Coll.) S.T.B. (Catholic Univ.) Columbia Coll. Dubuque, Iowa
THOMAS, Prof. C. F., M.S. (Case) Case School of Appl. Sci., Cleveland, Ohio
THOMAS, Prof. EVAN. Coll. of Eng., Univ. of Vermont, Burlington, Vt. *187 Loomis St.*
THOMAS, Asst. Prof. R. W., M.S. (Washington and Jefferson) Washington and Jefferson Coll., Washington, Pa. *333 Wilson Ave.*
THOMAS, Asso. Prof. T. Y., Ph.D. (Princeton) Princeton Univ., Princeton, N. J. *Fine Hall*
THOME, W. J., C.E. (Mich. State Coll.) 223 Avalon Ave., Detroit, Mich.
THOMPSON, Asso. Prof. E. L., Ph.D. (Chicago) Texas Tech. Coll., Lubbock, Tex.
THOMPSON, HELEN, Ph.D. (Columbia) Research Assoc., Clinic of Child Devel., Yale Univ., New Haven, Conn. *14 Davenport Ave.*
THOMPSON, J. E., A.M. (Columbia) Instr., Pratt Inst., Brooklyn, N. Y. *116 Cambridge Pl.*
THOMPSON, Prof. MIRIAM A., A.M. (North Caroline) Limestone Coll., Gaffney, S. C.
THOMPSON, R. B., A.M. (Nebraska) Supt., High School, Beaver Crossing, Nebr.
THOMSEN, H. IVAH, Ph.D. 1928 Mt. Royal Terrace, Baltimore, Md.
THOMSON, J. F., Ph.D. (Michigan) Instr., Tulane Univ., New Orleans, La. *139 S. Genois St.*
THORNTON, H. B., A.M. (Cincinnati) Head of Dept., Sumner Jr. Coll., Kansas City, Kans.
THORP, ELLA A. M., A.B. (Minnesota) Instr., Univ. of Minnesota, Minneapolis, Minn. *656 Jefferson St. N.E.*
THUENER, Sister M. DOMITILLA, Ph.D. (Catholic Univ.) Head of Dept., Villa Madonna Coll., Covington, Ky. *Villa Madonna Convent, R. R. 2, Box 33*
TILLEY, Asst. Prof. ARTHUR, Ph.D. (New York Univ.) Washington Square Coll., New York Univ., New York, N. Y.
TINNER, Prof. J. C., M.S. (Chicago) Langston Univ., Langston, Okla.
TITSWORTH, Mrs. H. L., A.B. (Tulane) Fellow, Newcomb Coll., New Orleans, La. *2320 Nashville Ave.*
TITSWORTH, Prof. W. A., M.S. (Wisconsin) Prof. of Math. and Registrar, Alfred Univ., Alfred, N. Y.
TITT, Prof. H. G., A.M. (Michigan) Huron Coll., Huron, S. D. *959 Ohio Ave., S.W.*
TITUS, C. M., A.M. (Stanford) Instr., Univ. Farm School, Davis, Calif.
TODD, H. F. Teacher, Jr. High School. Leewood, W. Va. *Eskdale, W. Va.*
TOOPS, Prof. H. A., Ph. D. (Columbia) Psych., Ohio State Univ., Columbus, Ohio
TORRANCE, C. C., Ph.D. (Cornell) Research Asst., Inst. for Advanced Study, Princeton, N. J. *Fine Hall*
TORREY, Asso. Prof. MARIAN M., Ph.D. (Cornell) Goucher Coll., Baltimore, Md.
TOUTON, Prof. F. C., Ph.D. (Columbia) Vice-Pres. and Dir. of Educational Program, Univ. of Southern California, Los Angeles, Calif.
TRACEY, Asso. Prof. J. I., Ph.D. (Johns Hopkins) Yale Univ., New Haven, Conn. *84 McKinley Ave.*
TREMBLAY, Prof. ALTHÉOD, M.A. (Laval) Higher Math., Laval Univ., Quebec, P. Q., Can. *367 St. Cyrille St.*
TREVOR, Prof. J. E., Ph.D. (Leipzig) Thermodynamics, Cornell Univ., Ithaca, N. Y.
TRIPP, Prof. M. O., Ph.D. (Columbia) Wittenberg Coll., Springfield, Ohio

TUCKER, B. A., A.M. (Millsaps Coll.) Southeastern Louisiana Coll., Hammond, La. *Box 726*
TURNER, Prof. A. B., Ph.D. (Pennsylvania) Coll. of the City of New York, New York, N. Y. *245 N. Mountain Ave., Montclair, N. J.*
TURNER, Prof. BIRD M., Ph.D. (Bryn Mawr) West Virginia Univ., Morgantown, W. Va. *107 High St.*
TURNER, Asso. Prof. J. S., Ph.D. (Chicago) Iowa State Coll., Ames, Iowa. *2514 Knapp St.*
TURNER, Prof. LAURA N., A.M. (Michigan) Prairie View State Coll., Prairie View, Tex. *Box 552*
TYLER, A. C., A.B. (Princeton) Headmaster, Providence Country Day School, East Providence, R. I. *2117 Pawtucket Ave.*
TYLER, H. W., Ph.D. (Erlangen) Consultant, Liby. of Congress; Genl. Secy., Amer. Asso. of Univ. Professors, Washington, D. C. *26 Jackson Pl.*
TYLER, Asso. Prof. JOHN, A.M. (William and Mary) U. S. Naval Acad., Annapolis, Md. *3 Southgate Ave.*

UHLER, Asso. Prof. H. S., Ph.D. (Johns Hopkins) Physics, Yale Univ., New Haven, Conn. *Sloane Physics Lab.*
ULRICH, F. E., A.M. (Harvard) Instr., Union Coll., Schenectady, N. Y. *37 Ray St.*
UNDERHILL, Asso. Prof. A. L., Ph.D. (Chicago) Univ. of Minnesota, Minneapolis, Minn. *100 Folwell Hall*
UNDERWOOD, P. H. Ball High School, Galveston Tex. *2527 Ave. I*
UNDERWOOD, Prof. R. S., Ph.D. (Chicago) Texas Tech. Coll., Lubbock, Tex.
UPTON, Prof. C. B., A.M. (Columbia) Teachers Coll., Columbia Univ., New York, N. Y.
URNER, S. E., Ph.D. (Harvard) Instr., Jr. Coll., Los Angeles, Calif. *807 N. Mariposa Ave.*

VAN ARNAM, R. N., M.S. (Cornell) Instr., Math. and Astr., Lehigh Univ., Bethlehem, Pa. *705 First Ave.*
VAN BUSKIRK, Prof. H. C., Ph.B. (Cornell) California Inst. of Tech., Pasadena, Calif. *390 S. Holliston Ave.*
VANDIVER, Asso. Prof. H. S. Pure Math., Univ. of Texas, Austin, Tex.
VANHEE, LOUIS, D.D. Jesuit Father, 11 Rue des Récollets, Louvain, Belgium
VAN ORSTRAND, C. E., M.S. (Michigan) Geophysicist, U. S. Geol. Survey, Washington, D. C. *1607–31st St. N. W.*
VAN VELZER, Prof. C. A., Ph.D. (Hillsdale) Carthage Coll., Carthage, Ill. *903 Buchanan St.*
VAN VLECK, Prof. E. B., Ph.D. (Göttingen) Emeritus, Univ. of Wisconsin, Madison, Wis. *519 N. Pinckney St.*
VASS, J. I., A.M. (Northwestern) Instr., Univ. of Wisconsin, Extension Div., Milwaukee, Wis. *623 W. State St.*
VEATCH, Asst. Prof. R. W., A.M. (Northwestern) Univ. of Tulsa, Tulsa, Okla.
VEBLEN, Prof. OSWALD, Ph.D. (Chicago) Inst. for Advanced Study, Princeton, N. J. *58 Battle Rd.*
VEDDER, Prof. J. N., A.M. Union Coll., Schenectady, N. Y.
VEHSE, Asst. Prof. C. H., Ph.D. (Brown) West Virginia Univ., Morgantown, W. Va.
VELTON, BEATRICE M., B.S. (New Jersey Coll. for Women) Actuarial Clerk, Metropolitan Life Ins. Co., New York, N. Y. *72 Commerce St., Rahway, N. J.*
VIRTS, R. O., A.M. (Indiana) Teacher, High School, Ft. Wayne, Ind. *4746 Stratford Rd.*
VIVIAN, ROXANNA H., Ph.D. (Pennsylvania) Dean, High School, Rye, N. Y. *66 Milton Rd.*
VON NEUMANN, Prof. JOHN, Ph.D. (Budapest), Ing. Chem. (Zürich) Inst. for Advanced Study, Princeton, N. J. *162 Library Pl.*

WADE, T. L., Jr., Ph.D. (Virginia) Asst. Instr., Univ. of Virginia, University, Va. *R.F.D. 1, Box 161-B, Charlottesville, Va.*
WAGNER, Asso. Prof. C. C., Ph.D. (Michigan) Pennsylvania State Coll., State College, Pa. *247 S. Barnard St.*
WAGNER, E. H., Ph.D. (Michigan) Life and Casualty Co. of Chicago, Chicago, Ill. *6723 Glenwood Ave.*
WAGNER, Prof. P. S., Ph.D. (Johns Hopkins) Lebanon Valley Coll., Annville, Pa.
WAHLERT, H. E., A.M. (Princeton) Instr., Washington Square Coll., New York Univ., New York, N. Y. *45 Hudson St., Farmingdale, N. Y.*
WAHLIN, Prof. G. E., Ph.D. (Yale) Univ. of Missouri, Columbia, Mo. *1401 Anthony St.*
WAIDER, K. J., A.B. (San Francisco) Instr., Math. and Physics, Univ. of San Francisco, San Francisco, Calif. *2130 Fulton St.*
WALDER, O. E., A.M. (Nebraska) Grad. student, Univ. of Minnesota, Minneapolis, Minn. *716–13th Ave. S. E.*
WALKER, CATHARINE L., A.M. (Columbia) Instr., Jr. Coll., Fort Smith, Ark.
WALKER, EVELYN, Ph.D. (Columbia) 122 Ascan Ave., Forest Hills, N. Y.

WALKER, Asst. Prof. HELEN M., Ph.D. (Columbia) Educ., Teachers Coll., Columbia Univ , New York, N. Y.
WALKER, R. J., B.S. (Carnegie Inst. of Tech.) Part-time Instr., Princeton Univ., Princeton, N. J. *Fine Hall*
WALLACE, Prof. A. M., M.S. (Oklahoma) East Central State Teachers Coll., Ada, Okla.
WALLIS, W. J., A.M. (Columbian Univ.), LL.B. (George Washington) Head of Dept., Wilson Teachers Coll., Washington, D. C.
WALSH, C. M., A.B. (Harvard) Bellport, L. I., N. Y.
WALSH, Asso. Prof. J. L., Ph.D. (Harvard) Harvard Univ., Cambridge, Mass. *471 Widener Lib'y.*
WALTER, Asst. Prof. R. M., A.M. (Columbia) New Jersey Coll. for Women, New Brunswick, N. J.
WALTER, R. N., A.B. (Brooklyn Coll.) 119 Foster Ave., Brooklyn, N. Y.
WALTERS, E. L., A.M. (Syracuse) Grad. Asst., Ohio State Univ., Columbus, Ohio. *1502 Michigan Ave.*
WALTHER, HENRY, A.M. (Columbia) Research Engr., Bell Telephone Labs., New York, N. Y. *463 West St.*
WALTON, Prof. T. O., Ph.D. (Michigan) Kalamazoo Coll., Kalamazoo, Mich.
WALTZ, Asst. Prof. A. K., Ph.D. (Cornell) Clarkson Coll., Potsdam, N. Y. *52 Bay St.*
WAPPLE, Asso. Prof. A. R., A.M. (California) Math. and Physics, Southwestern Univ., Georgetown, Tex.
WARD, ETHEL RUTH, A.M. (North Carolina) Address unknown
WARD, Asst. Prof. L. E., Ph.D. (Harvard) Univ. of Iowa, Iowa City, Iowa. *120 Physics Bldg.*
WARD, Asst. Prof. MORGAN, Ph.D. (Calif. Inst. of Tech.) California Inst. of Tech., Pasadena, Calif.
WARNER, I. N., B.S. (Chicago) Instr., State Teachers Coll., Platteville, Wis.
WARREN, Prof. L. A. H., Ph.D. (Chicago) Univ. of Manitoba, Winnipeg, Man., Can. *64 Niagara St.*
WASHBURNE, A. C., Grad. (U. S. Milit. Acad.) Actuary, Berkshire Life Ins. Co., Pittsfield, Mass.
WATKEYS, Prof. C. W., A.M. (Harvard) Univ. of Rochester, Rochester, N. Y. *60 Castleman Rd.*
WATT, Asso. Prof. MARTHA W., A.M. (Columbia) Wheaton Coll., Norton, Mass. *2144 Broad St., Providence, R. I.*
WATTS, C.B., A.B. (Indiana) Astronomer, U. S. Naval Observ., Washington, D. C.
WEAR, Asso. Prof. L. E., Ph.D. (Johns Hopkins) California Inst. of Tech., Pasadena, Calif. *2247 Lambert Drive*
WEAVER, C. L., B.S. (Kent State Coll.) Student Actuary, New England Mut. Life Ins. Co., Boston, Mass. *Actuarial Dept., 95 Milk St.*
WEAVER, Prof. J. H., Ph.D. (Pennsylvania) Ohio State Univ., Columbus, Ohio. *Hilliard, Ohio*
WEAVER, WARREN, Ph.D. (Wisconsin) Director, The Natural Sciences, Rockefeller Foundation, New York, N. Y. *160 Brite Ave., Scarsdale, N. Y.*
WEBBER, Prof. W. P., Ph.D. (Cincinnati) Louisiana State Univ., Baton Rouge, La.
WEBER, Prof. W. W., A.M. (Georgia) Columbia Coll., College Place, S. C. *Box 2*
WEBSTER, Asso. Prof. LOUISA M., M.S. (New York Univ.) Hunter Coll., New York, N. Y. *218–41–99 Ave., Queens Village, L. I., N. Y.*
WECHSLER, A. L., A.M. (Columbia) Instr., Univ. Extension, Columbia Univ., New York, N. Y. *Apt. No. 712, 27 W. 72nd St.*
WEDDERBURN, Prof. J. H. M., D.Sc. (Edinburgh) Princeton Univ., Princeton, N. J. *Fine Hall*
WEIDA, Asso. Prof. F. M., Ph.D. (Iowa) George Washington Univ., Washington, D. C.
WEIMER, F. G., M.S. (West Virginia) Asst. Mgr., Weimer Packing Co., Wheeling, W. Va. *42 Heiskell St., Edgwood*
WEINBERG, Prof. E. F., C.E. (Manhattan) Rollins Coll., Winter Park, Fla. *P. O. Box 952*
WEINBERGER, M. S., A.B. (Iowa) 3311 Pleasant Ave., Des Moines, Iowa
WEISNER, Asst. Prof. LOUIS, Ph.D. (Columbia) Hunter Coll., New York, N. Y.
WEISS, Asst. Prof. MARIE J., Ph.D. (Stanford) Newcomb Coll., New Orleans, La.
WELKOWITZ, SAMUEL, B.S. (C.C.N.Y.) First Asst. in Math., F. K. Lane High School, Brooklyn, N. Y. *439 Linden Blvd.*
WELLING, W. C., A.B. (Yale) Dir., Bureau of Vital Statistics, State Dept. of Health, Hartford, Conn. *Drawer K, Sta. A*
WELLS, Asst. Prof. E. D., A.M. (Minnesota) Univ. of Pittsburgh, Erie Center, Erie, Pa. *615 W. Tenth St.*
WELLS, Prof. MARY EVELYN, Ph.D. (Chicago) Vassar Coll., Poughkeepsie, N. Y.

WELLS, Prof. R. A., A.M. (Michigan) Park Coll., Parkville, Mo.
WELLS, Asso. Prof. V. H., Ph.D. (Michigan) Williams Coll., Williamstown, Mass. *3 Chapin Ct.*
WELTON, P. L., A.M. (Michigan) Address unknown
WENTE, IRENE L,. M S. (Chicago) Instr., State Coll., Brookings, S. D.
WERNICKE, PAUL, Ph.D. (Göttingen) Patent Examiner, U. S. Patent Office, Washington, D. C. *3600 S Dakota Ave. N. E.*
WESCOTT, M. E., B.S. (Northwestern) Instr., Northwestern Univ., Evanston, Ill. *126 Callan Ave.*
WEST, ADA H., A.M. (Kansas) 1632 Franklin St., Keokuk, Iowa
WEST, Mrs. GRACE R., A.M. (Texas) Teacher, High School, Tulsa, Okla. *820 S. Main St.*
WEST, Asst. Prof. J. M., A.M. (Hamilton) Pennsylvania State Coll., State College, Pa. *511 N. Burrowes St.*
WESTEMEIER, J. J., M.S. (Iowa State Coll.) Catholic Coll., Des Moines, Iowa
WESTER, Prof. C. W., A.M. (Washington) State Teachers Coll., Cedar Falls, Iowa. *823 W. Sixth St.*
WESTFALL, Prof. W. D. A., Ph.D. (Göttingen) Univ. of Missouri, Columbia, Mo. *11 S. Glenwood Ave.*
WHEELER, A. H., A.M. (Clark) Teacher, North High School, Worcester, Mass. *16 Bellevue St.*
WHEELER, Mrs. ANNA PELL, Ph.D. (Chicago) Prof., Bryn Mawr Coll., Bryn Mawr, Pa.
WHEELER, Asso. Prof. CHARLES H., III, Ph.D. (Johns Hopkins) Univ. of Richmond, Richmond, Va. *Box 83*
WHEELER, Asst. Prof. J. J., A.M. (Kansas) Univ. of Kansas, Lawrence, Kans. *1024 Alabama St.*
WHELAN, Asst. Prof. A. MARIE, Ph.D. (Johns Hopkins) Hunter Coll., New York, N. Y. *210 E. 68th St.*
WHITE, Prof. A. E., M.S. (Purdue) State Agric. Coll., Manhattan, Kans.
WHITE, Prof. C. E., A.M. (Indiana) Muskingum Coll., New Concord, Ohio
WHITE, Asso. Prof. MARION B., Ph.D. (Chicago) Carleton Coll., Northfield, Minn.
WHITED WILLIS, M.E. (Ames) Consulting Bridge Engr., Retired, State Highway Dept., Harrisburg, Pa. *26 S. 3rd St.*
WHITFORD, Prof. A. E., A.M. (Wisconsin) Alfred Univ., Alfred, N. Y.
WHITFORD, Asst. Prof. D. E., A.M. (Brown), Ed.M. (Harvard) Poly. Inst. of Brooklyn, Brooklyn, N. Y. *85–99 Livingston St.*
WHITFORD, Asso. Prof. E. E., Ph.D. (Columbia) Coll. of the City of New York, New York, N. Y. *535 W. 110th St.*
WHITING, MABEL G., A.M. (Oberlin) Registrar and Teacher, Jr. Coll., Santa Ana, Calif. *506 E. Chestnut Ave.*
WHITMAN, Asso. Prof. E. A., A.M. (Pittsburgh) Carnegie Inst. of Tech., Pittsburgh, Pa. *521 Locust St., Edgewood*
WHITNEY, ANNA M., A.M. (Columbia) Teacher, High School, Yakima, Wash. *203 S. 8th Ave.*
WHITTED, Prof. J. A., A.M. (Southwestern) Ohio Northern Univ., Ada, Ohio. *219 W. Highland Ave.*
WHITTEMORE, Asso. Prof. J. K., A.M. (Harvard) Yale Univ., New Haven, Conn. *45 Lincoln St.*
WHYBURN, G. T., Ph.D. (Texas) Assoc., Johns Hopkins Univ., Baltimore, Md.
WHYBURN, Asso. Prof. W. M., Ph.D. (Texas) Univ. of California at Los Angeles, Los Angeles, Calif.
WIDDER, Asso. Prof. D. V., Ph.D. (Harvard) Harvard Univ., Cambridge, Mass. *Widener 572*
WIGGIN, Asso. Prof. EVELYN P., A.M. (Brown) Randolph-Macon Woman's Coll., Lynchburg, Va.
WILBUR, Asso. Prof. W. E., M.S. (Maine) Univ. of New Hampshire, Durham, N. H.
WILCZEWSKI, Rev. JOSEPH, Ph.D. (St. Louis Univ.) Prof., Marquette Univ., Milwaukee, Wis. *1131 Wisconsin Ave.*
WILDER, Prof. C. E., Ph.D. (Harvard) Dartmouth Coll., Hanover, N. H.
WILDER, MARIAN A., Ph.D. (Minnesota) Asst., Univ. of Minnesota, Minneapolis, Minn. *3320 Second Ave. S.*
WILDER, Asso. Prof. R. L., Ph.D. (Texas) Univ. of Michigan, Ann Arbor, Mich., *On leave 1933–1934, Inst. for Advanced Study, Princeton, N. J. Fine Hall*
WILDERMUTH, Asso. Prof. R. B., A.M. (Ohio State) Capital Univ., Columbus, Ohio
WILEY, Asso. Prof. ELLEN E., A.B. (St. Lawrence) Middlebury Coll., Middlebury, Vt. *120 Main St.*
WILEY, Prof. F. B., Ph.D. (Chicago) Denison Univ., Granville, Ohio

WILKINS, Asso. Prof. P. D., M.S. (Case) Bates Coll., Lewiston, Me. *76 Bardwell St.*
WILLETT, Prof. H. C., A.M. (So. Calif.) Director of Admissions, Univ. of Southern California, Los Angeles, Calif.
WILLEY, MAUD, A.M. (Mills Coll.) Box 151, Long Beach, Miss.
WILLIAMS, Asst. Prof. A. R., Ph.D. (California) Univ. of California, Berkeley, Calif. *455 Wheeler Hall*
WILLIAMS, F. G., Ph.D. (Cornell) Teacher, Mary Lyon School, Swarthmore, Pa. *401 Swarthmore Ave.*
WILLIAMS, Asst. Prof. G. A., A.M. (California) Oregon State Coll., Corvallis, Ore. *907 Madison St.*
WILLIAMS, Prof. J. E., Ph.D. (Virginia) Dean, Virginia Poly. Inst., Blacksburg, Va.
WILLIAMS, Prof. K. P., Ph.D. (Princeton) Indiana Univ., Bloomington, Ind. *523 E. Third St.*
WILLIAMS, Asso. Prof. W. L., A.M. (South Carolina) Univ. of South Carolina, Columbia, S. C.
WILLIAMSON, Prof. C. O., Ph.D. (Chicago) Applied Math., Coll. of Wooster, Wooster, Ohio
WILLIAMSON, JOHN, Ph.D. (Chicago) Assoc., Johns Hopkins Univ., Baltimore, Md. *Dept. of Math.*
WILLIS, RUBY, A. B. (Wellesley) Head of Dept., Walnut Hill School, Natick, Mass.
WILLSON, Prof. F. N., C.E. (Rensselaer) Emeritus, Princeton Univ., Princeton, N. J.
WILMER, F. L. Odebolt, Iowa
WILSON, Asso. Prof. A. H., Ph.D. (Chicago) Haverford Coll, Haverford, Pa.
WILSON, Prof. C. L., M.S. (Kansas State Coll.) Mech. Eng., Prairie View State Coll., Prairie View, Tex. *P. O. Box 46*
WILSON, C. R., M.S. (Iowa) Instr., Rutgers Univ., New Brunswick, N. J.
WILSON, DOROTHY, A.M. (West Virginia) Head of Dept., Potomac State School, Keyser, W. Va. *305 S. Mineral St.*
WILSON, Prof. E. B., Ph.D. (Yale) Vital Statistics, Harvard Univ., Cambridge, Mass. *55 Van Dyke St., Boston, Mass.*
WILSON, ELIZABETH W., A.M. (Radcliffe) Actuary, Cambridge, Mass. *Mather Ct., Apt. 42*
WILSON, Prof. N. R., Ph.D. (Chicago) Univ. of Manitoba, Winnipeg, Man., Can. *989 Grosvenor Ave.*
WILSON, T. R. C., C.E. (Purdue) Sr. Engr., Forest Products Lab , Madison, Wis. *1911 Kendall Ave.*
WILSON, Prof. W. A., Ph.D. (Yale) Yale Univ., New Haven, Conn. *228 Park St.*
WILSON, Prof. W. H., Ph.D. (Illinois) Asst. Dean, Coll. of Arts and Sc., Univ. of Florida, Gainesville, Fla. *1242 N. Franklin St.*
WILTON, Prof. J. R., M.A. (Cantab.) Univ. of Adelaide, Adelaide, South Australia
WINBIGLER, Prof. ALICE, A.M. (Monmouth) Emeritus, Monmouth Coll., Monmouth, Ill. *808 E. Second Ave.*
WINGER, Prof. R. M., Ph.D. (Johns Hopkins) Univ. of Washington, Seattle, Wash.
WINKELMANN, Rev. G. L., M.S. (Chicago) Head of Dept., St. Johns Univ., Collegeville, Minn.
WINSLOW, Asst. Prof. J. B., A.M. (Michigan) Univ. of Toledo, Toledo, Ohio. *Temperance, Mich.*
WINSTON, CLEMENT, Ph.D. (Pennsylvania) Instr., Univ. of Pennsylvania, Philadelphia, Pa.
WINTERS, F. W., A.M. (Harvard) Bell Telephone Labs., New York, N. Y. *150–52 Bayside Ave., Flushing, L. I., N. Y.*
WINTON, L. S., A.M. (Oberlin) Grad. student, Duke Univ., Durham, N. C. *900 Dacian Ave.*
WISHARD, G. W., B.S. (Natl. Normal Univ.) 5134 Carthage Ave., Norwood, Ohio
WOLEVER, FRANCES E., A.M. (Illinois) Grad. Asst., Univ. of Illinois, Urbana, Ill. *Tuscola, Ill.*
WOLF, MARGARETE C., A.M. (Wisconsin) Grad. student, Univ. of Wisconsin, Madison, Wis. *West Allis, Wis.*
WOLFE, Asst. Prof. ALBERTA, M.S. (Iowa State Coll.) Western Coll., Oxford, Ohio
WOLFE, Asst. Prof. CLYDE, Ph.D. (California) California Inst. of Tech., Pasadena, Calif.
WOLFE, Asso. Prof. H. E., Ph.D. (Indiana) Indiana Univ., Bloomington, Ind. *316 N. Washington St.*
WONG, Asst. Prof. B. C., Ph.D. (California) Univ. of California, Berkeley, Calif. *1933 Grant St.*
WOO, Prof. KAMCHEUNG, Ph.D. (California) Sun Yatsen Univ., Canton, China. *Min Ming Rd.*
WOOD, Prof. FREDRICK, Ph.D. (Wisconsin) Math. and Mech., Univ. of Nevada, Reno, Nev. *Dept. of Math.*

WOOD, Asso. Prof. F. E., Ph.D. (Chicago) Northwestern Univ., Evanston, Ill. *909 Colfax St.*
WOOD, META A., A.M. (Wisconsin) 106 Morningside Drive, New York, N. Y.
WOOD, Prof. RUTH G., Ph.D. (Yale) Smith Coll., Northampton, Mass. *66 Beacon St., Florence, Mass.*
WOOD, R. R., B.S. (Haverford) Sec'y, Friends' Peace Committee, Philadelphia, Pa. *272 Main St., Moorestown, N. J.*
WOODMANSEE, Prof. W. R., A.M. (Wisconsin) Ripon Coll., Ripon, Wis.
WOODS, Prof. F. S., Ph.D. (Göttingen) Mass. Inst. of Tech., Cambridge, Mass.
WOODS, Asso. Prof. ROSCOE, Ph.D. (Illinois) Univ. of Iowa, Iowa City, Iowa. *119 Physics Bldg.*
WOODSON, G. F., Jr., A.M. (Ohio State) Head of Dept., Johnson C. Smith Univ., Charlotte, N. C.
WOOLARD, Asst. Prof. E. W., Ph.D. (George Washington) George Washington Univ., Washington, D. C.
WORTHINGTON, E. B., A.M. (Franklin and Marshall) Instr., Franklin and Marshall Acad., Lancaster, Pa.
WORTHINGTON, Asst. Prof. EUPHEMIA R., Ph.D. (Yale) Univ. of California at Los Angeles, Los Angeles, Calif.
WREN, Prof. F. L., Ph.D. (Chicago) Teaching of Math., George Peabody Coll., Nashville, Tenn.
WRESTLER, FERNA E., A.M. (Kansas) Head of Dept., Jr. Coll., El Dorado, Kans. *409 N. Taylor St.*
WRIGHT, Asst. Prof. FRANCES M., A.M. (Brown) Elmira Coll., Elmira, N. Y.
WRIGHT, FRANCES W., A.M. (Brown) Asst., Harvard Coll. Observ., Cambridge, Mass. *250 Brattle St.*
WRIGHT, Prof. H. A., Ph.D. (New York Univ.) Head of Dept., Transylvania Coll., Lexington, Ky.
WRIGHT, Asst. Prof. H. N., Ph.D. (California) Coll. of the City of New York, New York, N. Y. *3900 Greystone Ave.*
WRIGHT, VERA L., A.M. (Minnesota) Secy., Bluefield Monument Co., Bluefield, Va. *8 Academy St.*
WRIGHT, Prof. W. L., A.M. (Princeton) Lincoln Univ., Lincoln University, Pa.
WUNDER, C. N., Ph.D. (Virginia) Woodstock, Va.
WYANT, E. KATHRYN, Ph.D. (Missouri) Grad. student, Univ. of Chicago, Chicago, Ill. *142 S. Yale St., Villa Park, Ill.*
WYLIE, Asso. Prof. C. C., Ph.D. (Illinois) Astr., Univ. of Iowa, Iowa City, Iowa. *Univ. Observatory*

YANNEY, Prof. B. F., Ph.D. (Chicago) Coll. of Wooster, Wooster, Ohio. *666 N. Bever St.*
YANOSIK, Asst. Prof. G. A., C.E. (New York Univ.) New York Univ., New York, N. Y. *52 Greenvale Ave., Yonkers, N. Y.*
YARBROUGH, H. M., Ph.D. (Indiana) Head of Dept., State Teachers Coll., Bowling Green, Ky. *Route No. 4*
YEATON, Prof. C. H., Ph.D. (Chicago) Oberlin Coll., Oberlin, Ohio. *189 Forest St.*
YOTHERS, J. L., A.M. (Otterbein) Head of Dept., Coe Coll., Cedar Rapids, Iowa
YOUNG, Asso. Prof. J. W. A., Ph.D. (Clark) Univ. of Chicago, Chicago, Ill. *5422 Blackstone Ave.*
YOUNG, Prof. MABEL M., Ph.D. (Johns Hopkins) Wellesley Coll., Wellesley, Mass. *6 Norfolk Terrace*
YOUNG-WOODBRIDGE, MARGARET, Sc.D. (New York Univ.) Instr., Brooklyn Coll., Brooklyn, N. Y. *Box 148*
YOWELL, Prof. E. I., C.E., Ph.D. (Cincinnati) Prof. of Astr., Dir., Cincinnati Observ., Univ. of Cincinnati, Cincinnati, Ohio. *3127 Griest Ave.*

ZANT, Asst. Prof. J. H., A.M. (Columbia) Oklahoma A. and M. Coll., Stillwater, Okla.
ZARISKI, Asso. Prof. OSCAR, Ph.D. (Rome) Johns Hopkins Univ., Baltimore, Md. *Dept. of Math.*
ZELDIN, Asst. Prof. S. D., Ph.D. (Clark) Mass. Inst. of Tech., Cambridge, Mass.
ZIMMERMAN, B. C., A.M. (St. Louis Univ.) Orange Walk, British Honduras, Central America
ZIMMERMAN, Prof. JOHN, B.S. (Princeton) Univ. of Dubuque, Dubuque, Iowa. *1089 Glen Oak Ave.*
ZOCH, R. T., A.M. (George Washington) Principal Scientific Aid, U. S. Weather Bureau, Washington, D. C.

INSTITUTIONAL MEMBERS

California

Pomona College, Claremont
Occidental College, Los Angeles
University of California at Los Angeles, Los Angeles
University of Southern California, Los Angeles
California Institute of Technology, Pasadena
State Teachers College, San Diego
St. Ignatius College, San Francisco

Canada

University of Montreal, Montreal

Colorado

University of Colorado, Boulder

Connecticut

Wesleyan University, Middletown

Delaware

University of Delaware, Newark

Florida

John B. Stetson University, De Land

Georgia

University of Georgia, Athens
Georgia School of Technology, Atlanta
Georgia State College for Men, Tifton

Illinois

Armour Institute of Technology, Chicago
University of Chicago, Chicago
De Paul University, Chicago
St. Xavier College, Chicago
Northwestern University, Evanston
University of Illinois, Urbana

Indiana

Indiana University, Bloomington
Butler University, Indianapolis
Purdue University, LaFayette
University of Notre Dame, Notre Dame
St. Mary's College, Notre Dame
St. Mary-of-the-Woods College, St. Mary-of-the-Woods

Iowa

Iowa State College, Ames
St. Ambrose College, Davenport
Drake University, Des Moines
Columbia College, Dubuque
University of Iowa, Iowa City

Kansas

University of Kansas, Lawrence
Bethel College, Newton
University of Wichita, Wichita

Kentucky

University of Kentucky, Lexington

INSTITUTIONAL MEMBERS (*continued*)

LOUISIANA

LOUISIANA STATE UNIVERSITY, Baton Rouge
LOUISIANA STATE NORMAL COLLEGE, Natchitoches
LOYOLA UNIVERSITY, New Orleans
LOUISIANA POLYTECHNIC INSTITUTE, Ruston
CENTENARY COLLEGE, Shreveport

MAINE

UNIVERSITY OF MAINE, Orono

MARYLAND

ST. JOHN'S COLLEGE, Annapolis

MASSACHUSETTS

AMHERST COLLEGE, Amherst
BOSTON UNIVERSITY, Boston
NORTHEASTERN UNIVERSITY, Boston
HARVARD UNIVERSITY, Cambridge
WELLESLEY COLLEGE, Wellesley
WORCESTER POLYTECHNIC INSTITUTE, Worcester

MICHIGAN

UNIVERSITY OF MICHIGAN, Ann Arbor
COLLEGE OF THE CITY OF DETROIT, Detroit
MICHIGAN STATE COLLEGE, East Lansing
KALAMAZOO COLLEGE, Kalamazoo
MICHIGAN STATE NORMAL COLLEGE, Ypsilanti

MINNESOTA

AUGSBURG COLLEGE, Minneapolis
UNIVERSITY OF MINNESOTA, Minneapolis
CARLETON COLLEGE, Northfield
COLLEGE OF ST. TERESA, Winona

MISSOURI

MISSOURI SCHOOL OF MINES AND METALLURGY, Rolla
THE PRINCIPIA, St. Louis
WASHINGTON UNIVERSITY, St. Louis

MONTANA

UNIVERSITY OF MONTANA, Missoula

NEBRASKA

UNIVERSITY OF NEBRASKA, Lincoln
CREIGHTON UNIVERSITY, Omaha
STATE TEACHERS COLLEGE, Peru

NEW HAMPSHIRE

UNIVERSITY OF NEW HAMPSHIRE, Durham
DARTMOUTH COLLEGE, Hanover

NEW JERSEY

NEW JERSEY COLLEGE FOR WOMEN, New Brunswick
RUTGERS UNIVERSITY, New Brunswick
PRINCETON UNIVERSITY, Princeton

NEW MEXICO

UNIVERSITY OF NEW MEXICO, Albuquerque
NEW MEXICO NORMAL UNIVERSITY, Las Vegas

INSTITUTIONAL MEMBERS (*continued*)

NEW YORK

NEW YORK STATE COLLEGE FOR TEACHERS, Albany
WELLS COLLEGE, Aurora
UNIVERSITY OF BUFFALO, Buffalo
HAMILTON COLLEGE, Clinton
ELMIRA COLLEGE, Elmira
ADELPHI COLLEGE, Garden City
COLLEGE OF MOUNT ST. VINCENT, Mount St. Vincent-on-Hudson
COLLEGE OF THE CITY OF NEW YORK, New York
COLUMBIA UNIVERSITY, New York
COOPER UNION, New York
HUNTER COLLEGE OF THE CITY OF NEW YORK, New York
NEW YORK UNIVERSITY, New York
COLLEGE OF THE SACRED HEART, New York
NIAGARA UNIVERSITY, Niagara University
UNIVERSITY OF ROCHESTER, Rochester
ST. BONAVENTURE COLLEGE, St. Bonaventure
UNION COLLEGE, Schenectady

NORTH CAROLINA

NORTH CAROLINA STATE COLLEGE, Raleigh

OHIO

UNIVERSITY OF AKRON, Akron
UNIVERSITY OF CINCINNATI, Cincinnati
CASE SCHOOL OF APPLIED SCIENCE, Cleveland
WESTERN RESERVE UNIVERSITY, Cleveland
OHIO WESLEYAN UNIVERSITY, Delaware
KENYON COLLEGE, Gambier
DENISON UNIVERSITY, Granville
HIRAM COLLEGE, Hiram
OBERLIN COLLEGE, Oberlin
OTTERBEIN COLLEGE, Westerville
COLLEGE OF WOOSTER, Wooster
ANTIOCH COLLEGE, Yellow Springs

OKLAHOMA

UNIVERSITY OF OKLAHOMA, Norman
OKLAHOMA CITY UNIVERSITY, Oklahoma City

PENNSYLVANIA

BRYN MAWR COLLEGE, Bryn Mawr
LAFAYETTE COLLEGE, Easton
SETON HILL COLLEGE, Greensburg
ALLEGHENY COLLEGE, Meadville
WESTMINSTER COLLEGE, New Wilmington
DREXEL INSTITUTE, Philadelphia
PENNSYLVANIA COLLEGE FOR WOMEN, Pittsburgh
SWARTHMORE COLLEGE, Swarthmore
WASHINGTON AND JEFFERSON COLLEGE, Washington

RHODE ISLAND

BROWN UNIVERSITY, Providence
PROVIDENCE COLLEGE, Providence

SOUTH CAROLINA

UNIVERSITY OF SOUTH CAROLINA, Columbia

TENNESSEE

GEORGE PEABODY COLLEGE FOR TEACHERS, Nashville

TEXAS

WEST TEXAS STATE TEACHERS COLLEGE, Canyon
SOUTHERN METHODIST UNIVERSITY, Dallas
RICE INSTITUTE, Houston

UTAH

UNIVERSITY OF UTAH, Salt Lake City

VERMONT

MIDDLEBURY COLLEGE, Middlebury

VIRGINIA

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg
UNIVERSITY OF VIRGINIA, University
COLLEGE OF WILLIAM AND MARY, Williamsburg

WEST VIRGINIA

BETHANY COLLEGE, Bethany

WYOMING

UNIVERSITY OF WYOMING, Laramie

RECAPITULATION OF MEMBERSHIP

Individual members November 24, 1933	1,913	
Institutional members November 24, 1933	127	
Total membership November 24, 1933		2,040

CHARTER MEMBERSHIP

Individual charter members	1,045	
Institutional charter members	52	
Total charter membership		1,097
Net gain in individual members	868	
Net gain in institutional members	75	
Total net gain over charter membership		943

GEOGRAPHICAL DISTRIBUTION OF INDIVIDUAL MEMBERS

UNITED STATES AND CANADA

ALABAMA. (15)

AUBURN. Crenshaw, Hampton, Killebrew, Robinson.
BIRMINGHAM. Eagles, Hess, Moore.
FLORENCE. Culmer.
MARION. Allen, Murfee.
MOBILE. Meyer.
MONTEVALLO. Jackson.
UNIVERSITY. Lewis, Ott, Rodgers.

ARIZONA. (8)

FLAGSTAFF. Lampland, Risselman.
TUCSON. Graesser, Keyes, Leonard, Mewborn, Shaw, C. F. Smith.

ARKANSAS. (6)

FAYETTEVILLE. Adkisson, Harding, Hosford, Nichols.
FORT SMITH. Walker.
LITTLE ROCK. Bigbee.

CALIFORNIA. (84)

ATASCADERO. Anderson.
BERKELEY. Bernstein, Duncan, Haskell, Irwin, Lehmer, Levy, Mason, Noble, Osgood, Putnam, Williams, Wong.
CHICO. Iloff.
CLAREMONT. Berry, Jaeger.
DAVIS. Titus.
FRESNO. Morris, C. E. Smith.
FULLERTON. Ernsberger, Reynolds.
GLENDALE. Bolton.
HOLLYWOOD. Entz.
LA JOLLA. McEwen.
LONG BEACH. Buckman, Lodwick.
LOS ANGELES. Allen, Ames, Bell, Campbell, Collier, Daus, Garver, Gaver, Glazier, Hedrick, Hunt, James, Kaelin, McClellan, McDonald, Mason, Orange, Perry, Sherwood, Showman, Steed, Touton, Urner, Whyburn, Willett, Worthington.
MILLS COLLEGE. Alderton.
MORGAN HILL. Pollock.
PALO ALTO. Hoskins, Stager.
PASADENA. Bateman, Bell, Birchby, Clifford, Meek, Michal, Van Buskirk, Ward, Wear, Wolfe.
REDLANDS, Albert, Keith.
RIVERSIDE. Linhart.
SAN DIEGO. Gleason, Klauber, Livingston.
SAN FRANCISCO. Ivanoff, McCarty, Waider.
SANTA ANA. Whiting.
SANTA MARIA. Funk.
STANFORD UNIVERSITY. Blichfeldt, Eells, Luther, Moreno.
STOCKTON. Corbin.
TAFT. Robb.
WHITTIER. Skarstedt.

CANADA. (32)

EDMONTON. Campbell, Cook, Sheldon.
HAMILTON. Findlay.
KINGSTON. Gummer, Johnston, Matheson, Miller.
LENNOXVILLE. Home, Richardson.
LONDON. Kingston.
MONTREAL. Murray, Pelletier.
OTTAWA. Dube, Henroteau.
QUEBEC. Savary, Tremblay.
SACKVILLE. McEwen.
SASKATOON. Ling, Pyke.
TORONTO. Beatty, De Lury, Pounder, Roseburgh, Synge.
VANCOUVER. Buchanan, Gage, Nowlan.
WINDSOR JUNCTION. Longley.
WINNIPEG. Warren, Wilson.
WOLFVILLE. Jeffery.

COLORADO. (26)

BOULDER. Britton, De Long, Hutchinson, Johnson, Kempner, Kendall, Lester, Light, McMaster, Nelson.
COLORADO SPRINGS. Folk, Lovitt, Purcell, Sisam.
DENVER, Carmichael, Gorrell, Lewis, McGinley, Rainville, Recht, Sabin.
FORT COLLINS. Clark, Macdonald.
GOLDEN. Everett, Fitterer, Hebel.

CONNECTICUT. (37)

HARTFORD. Dadourian, Donchian, Elston, B. D. Flynn, J. D. Flynn, Keffer, Mitchell, Welling.
MIDDLETOWN. Arnold, Camp, Howland.
MILFORD. Burgess, Rosenbaum.
NEW HAVEN. Barney, E. W. Brown, Church, Engstrom, Fisher, Hall, Hille, Kovarik, Longley, Miles, Ore, Pierpont, P. F. Smith, Thompson, Tracey, Uhler, Whittemore, Wilson.
NEW LONDON. Bower, Dimick, Leib.
ROXBURY STATION. Haas.
STORRS. Cheney.
WEST HAVEN. Anderton.

CUBA. (1)

HAVANA. Corral y Alemán.

DELAWARE. (8)

DOVER. Short.

LAUREL. Stauffer.
NEWARK. Harding, Harter, McDougle, Rees.
WILMINGTON. Gardiner, R. W. Jones.

DISTRICT OF COLUMBIA. (43)

BROOKLAND. Landry.
WASHINGTON. Adams, Aitchison, Arnaud, Ashmun, Avers, Blake, Claire, Cromwell, Darling, Duerksen, Edmonston, Eells, Ewin, Federico, Fleming, Goldberg, Gosnell, Greville, Hamilton, Johnston, Keulegan, Lambert, Lennahan, Mangold, Mears, Ramler, Rees, Rice, Richmond, Roos, Scheier, Shenton, Stevens, Taylor, Tyler, Van Orstrand, Wallis, Watts, Weida, Wernicke, Woolard, Zoch.

FLORIDA. (15)

DE LAND. Faulkner.
GAINESVILLE. Davis, Dostal, Kokomoor, Kusner, Messick, Pirenian, Simpson, Wilson.
LAKELAND. Cox, Reinsch.
MIAMI BEACH. Palmié.
TALLAHASSEE. Larson, E. R. Smith.
WINTER PARK. Weinberg.

GEORGIA. (23)

ATHENS. Barrow, Callaway, Cumming, Hill, Stephens.
ATLANTA. Field, Fulmer, Hefner, Hook, Morton, Patton, Reves, Skiles, D. M. Smith.
BOWDEN. Edwards.
COLLEGEBORO. Perry.
DECATUR. Gaylord, Robinson.
DEMOREST. Rogers.
EMORY UNIVERSITY. Messick.
FORSYTH. Plymale.
ROME. Hightower.
TOCCOA. Cox.

HAWAII. (1)

HONOLULU. Donaghho.

IDAHO. (2)

BOISE. McFarland.
CALDWELL. Rankin.

ILLINOIS. (112)

ALTON. Baker.
BLOOMINGTON. Hunt.
BLUFFS. Carter.
CARBONDALE. Gadske.
CARTHAGE. Van Velzer.
CHAMPAIGN. Hartley, Moore.
CHARLESTON. Taylor.
CHICAGO. Barnard, Bartky, Bay, Bibb, Bliss, Butler, Burdick, Campbell, Christman, Cobb, Davis, Dickson, Ettinger, Everett, Garnett, Georges, Gerst, Graves, Haggard, Kinney, Krathwohl, Kurzin, Lane, Lange, Lasser, Logsdon, Lunn, MacMillan, Moulton, Nicolet, Rasmusen, Reid, Roeser, Sanger, Schweitzer, Slaught, Spencer, Teach, Wagner, Wyant, Young.
CLINTON. Querfeld.
DECATUR. Kiefer.
DE KALB. Parson.
EUREKA. Newson.
EVANSTON. Curtiss, Garabedian, Holgate, Mac Martin, Moulton, Newell, Simmons, Wescott, Wood.
FREEPORT. Martin, Mensenkamp.
GALESBURG. Heren, Sellew, Stephens.
GURNEE. Johnston.
JACKSONVILLE. Anderson, Miller.
LAKE FOREST. Curtis.
LA SALLE. Carus, Rabe.
LEBANON, Stowell.
LINCOLN. Balof.
MACOMB. Ginnings, Schreiber.
MANHATTAN. Holloway.
MAYWOOD. Hildebrandt.
MONMOUTH. Beveridge, Winbigler.
NORMAL. Atkin, Flagg, Mills.
OAK PARK. Escott.
PEORIA. Comstock, Gault.
POPLAR GROVE. Newsom.
QUINCY. Braun.
RIVER FOREST. Dobbin.
ROCKFORD. McGavock.
ROCK ISLAND. Cederberg.
SANDWICH. Rumney.
TAYLORVILLE. Dappert.
TUSCOLA. Wolever.
URBANA. Armstrong, Bailey, Bower, D. M. Brown, Carmichael, Cell, Coble, Crathorne, Emch, Hazlett, Levy, Lytle, Miles, Miller, Peters, Rumsey.
WHEATON. Boyce, Hillard.

INDIANA. (54)

BLOOMINGTON. Davis, Hanna, Rothrock, Williams, Wolfe.
CRAWFORDSVILLE. Carscallen.
DANVILLE. Cole.
DELPHI. McCain.
EARLHAM. Long.
EAST CHICAGO. Darragh.
FORT WAYNE. d'Unger, Paxton, Reising, Virts.
GARY. Copp.
GOSHEN. Lehman.
GREENCASTLE. Arnold, Edington, Greenleaf.
HANOVER. Meyer.
INDIANAPOLIS. Banes, Butchart, Johnson, Lutz, Sullivan.
LA FAYETTE. Marshall, Mason, Miller.
MUNCIE. Edwards, Shiveley.
NORTH MANCHESTER. Dotterer.
NOTRE DAME. Caparó, Maurus.
SCIRCLEVILLE. Orr.
REYNOLDS. Erwin.
RICHMOND. Grant.
TERRE HAUTE. Kennedy, Shriner, Sousley.
WEST LAFAYETTE. Black, Bolks, Doan, Graves, Hadley, Happell, Hazard, Hodge, Hughes, Klinger, Long, Rankin, Robbins, Stone.
WHITING. Burrows.

IOWA. (50)

AMES. Brandner, Colpitts, Daniells, Fleming, Gouwens, Herr, J. V. McKelvey, M. M. McKelvey, Roberts, Robertson, E. R. Smith. Snedecor, Stagner, Turner.
CEDAR FALLS. Kearney, Wester.
CEDAR RAPIDS. Coffin, Yothers.
DECORAH. Strom.
DES MOINES. Corey, Neff, Weinberger, Westemeier.
DUBUQUE. Theobald, Zimmerman.
FAIRFIELD. Conlee.
FAYETTE. Deming.
FOREST CITY. Mundhjeld.
GRINNELL. McClenon, Rusk.
HOPKINTON. Earhart.
INDIANOLA. Emmons.
IOWA CITY. F. E. Baker, R. P. Baker, Chittenden, Conkwright, Craig, Ollivier, Reilly, Rietz, Ward, Woods, Wylie.
IOWA FALLS. Kreider.
KEOKUK. West.
LE MARS. Blue.
MOUNT VERNON. McGaw.
ODEBOLT. Wilmer.
SIOUX CITY. Graber, Gwinn.

KANSAS. (43)

ATCHISON. Pretz, Sullivan.
BALDWIN. Garrett.
EL DORADO. Wrestler.
EMPORIA. Peterson, Philips.
HAYS. Colyer.
HESSTON. Driver.
INDEPENDENCE. Bell.
KANSAS CITY. Dougherty, Thornton.
LAWRENCE. Ashton, Babcock, Black, Jordan, Mitchell, G. W. Smith, Stouffer, Wheeler.
LINDSBORG. Marm.
MANHATTAN. Babcock, Daugherty, Hyde, Janes, Lewis, Lyons, Mossman, Remick, Stratton, White.
NEWTON. Richert.
OTTAWA. Bennett.
PITTSBURG. German, Hill, Shirk.
SALINA. Ploenges.
TOPEKA. Harshbarger, Householder.
WICHITA. Hoare, Longenecker, Mendenhall Read, Reagan.

KENTUCKY. (28)

BEREA. Hutcherson, Pugsley.
BOWLING GREEN. Johnson, Yarbrough.
COVINGTON. Thuener.
DANVILLE. Fehn.
GEORGETOWN. Hatfield.
HOPKINSVILLE. Nowlan.
JACKSON. Fremd.
LEXINGTON. Allison, Boyd, Cohen, Davis, Downing, Latimer, LeStourgeon, Mathis, Pence, Rees, Wright.
LOUISVILLE. Anselm, Bullitt, Moore, Morrison, Simester, Stevenson.
MURRAY. Carman.
RICHMOND. Park.

LOUISIANA. (25)

BATON ROUGE. Nichols, O'Quinn, Sanders, H. L. Smith, Webber.
COLUMBIA. Redditt.
HAMMOND. Tucker.
LAFAYETTE. Buchanan.
NATCHITOCHES. Blair, Killen, Maddox.
NEW ORLEANS. Anderson, Buchanan, Dinwiddie, Duren, Frankenbush, Many, Menuet, Monasterio, Spencer, Thomson, Titsworth, Weiss.
RUSTON. P. K. Smith.
SHREVEPORT. Maizlish.

MAINE. (11)

BRUNSWICK. Hammond, Holmes, Korgen, Moody.
HOULTON. Morse.
LEWISTON. Ramsdell, Wilkins.
ORONO. Bryan, Hart, Jordan.
WATERVILLE. Ashcraft.

MARYLAND. (44)

ABERDEEN. Dederick.
ANNAPOLIS. Bingley, Bramble, Capron, Clayton, Clements, Dillingham, Kells, Leiper, Lyle, Rawlins, Root, Scarborough, Tyler.
BALTIMORE. Bacon, Bassler, Cohen, Dorroh, C. H. Harry, S. C. Harry, Lewis, Love, Mary Cordia, Morrill, Murnaghan, Reed, Reynolds, Richeson, Rowe, Thomsen, Torrey, Whyburn, Williamson, Zariski.
CHELTENHAM. Hartnell.
COLLEGE PARK. Alrich, Dantzig, Gwinner, Spann, Taliaferro.
CUMBERLAND. Hart.
EMITTSBURG. Burke.
FREDERICK. Brown.
PORT DEPOSIT. Haviland.

MASSACHUSETTS. (88)

AMESBURY. Dame.
AMHERST. Esty, Moore, Porter.
ANDOVER. Newton.
ATTLEBORO. Holt.
BELMONT. Douglass, Rutledge.
BOSTON. Andrew, Barber, Bruce, Garabedian, Gould, Laurentine, Leavens, Mode, Spear, Weaver, Wilson.
BROOKLINE. Miller.
CAMBRIDGE. Bailey, Beatley, Birkhoff, Bradley, Brown, Coolidge, Cooper, Crum, Feenberg, Franklin, Gaylord, Graustein, Huntington, Kennelly, Morse, Passano, Rice, Robinson, Seidel, Stabler, Starrett, Street, Walsh, Widder, Wilson, Woods, Wright, Zeldin.
DANVERS. Majella.
DORCHESTER. Davis, Heins, Quigley.
GROTON. Nash.
LEXINGTON. Moyle.
LOWELL. Aurelius.
MEDFORD. Miller.
NATICK. Willis.

NORTHAMPTON. Benedict, McCoy, Munroe, Rambo, Wood.
PETERSHAM. Moriarty.
PITTSFIELD. Washburne.
READING. Skofield.
SOUTH HADLEY. Doak, Martin.
SWAMPSCOTT. Evans.
TUFTS COLLEGE. Mergendahl, Ransom.
WELLESLEY. Copeland, Merrill, Morton, C. E. Smith, Stark, Young.
WESTON. Burke.
WILLIAMSTOWN. Agard, Dorwart, Hardy, Wells.
WOLLASTON. Dennison.
WORCESTER. Brown, Gay, Melville, Morley, Rice, Wheeler.

MICHIGAN. (64)

ALBION. Ingalls, Sleight.
ALMA. Clack.
ANN ARBOR. Ayres, Baten, Bradshaw, Churchill, Coe, Corliss, Craig, Denton, Elder, Field, Ford, Glover, Hildebrandt, Hopkins, Kaltenborn, Karpinski, Love, Nyswander, Raiford, Rainich, Rood, Rouse, Running, Schorling, Swanson, Wilder.
BAY CITY. Shellenbarger.
DETROIT. Baldwin, Darnell, Fisk, Folley, Johnson, Johnston, McCarthy, Mary Paula, Muehlman, Mullen, Nelson, Pixley, Thome.
EAST LANSING. Crowe, Grove, Olson, Plant, Powell, Speeker.
FLINT. Stout.
HILLSDALE. Herron.
HOUGHTON. Roman.
IRONWOOD. Field.
KALAMAZOO. Ackley, Blair, Everett, Walton.
MARQUETTE. Spooner.
MOUNT PLEASANT. Richtmeyer.
YPSILANTI. Barnhill, Erikson, Lindquist, Lyman, Matteson.

MINNESOTA. (47)

COLERAINE. Fattu, Tangjerd.
COLLEGEVILLE. Danzl, Hansen, Winkelmann.
DULUTH. Strane.
GILBERT. Schey.
MANKATO. Robbins.
MINNEAPOLIS. Brink, Brooke, Bussey, Carlson, Dalaker, Fischer, Gibbens, Gunstad, Guttman, Hart, Hartig, Jackson, Jensen, Kirchner, Ness, Priester, Quaid, Scammon, Schnell, Shuman, Shumway, Thorp, Underhill, Walder, Wilder.
MOORHEAD. Leonard.
NORTHFIELD. Gingrich, Solum, White.
ROCHESTER. Cruise.
ST. JOSEPH. Claudette.
ST. PAUL. Alice Irene, Blackall, Bush, Chellevold, Kingery, Mary Aloysius, Taylor.
VIRGINIA. Hancock.

MISSISSIPPI. (16)

BLUE MOUNTAIN. Hutchins.
CLEVELAND. Hickey.
GRENADA. Harris.
HATTIESBURG. Parker.
JACKSON. Babbitt, McCoy, Mitchell.
LONG BEACH. Willey.
RAYMOND. McDonald.
STATE COLLEGE. Caruthers, C. D. Smith.
TOUGALOO. Howe.
UNIVERSITY. Bickerstaff, Hume, Scott.
WESSON. Felder.

MISSOURI. (42)

CANTON. Ingold.
CAPE GIRARDEAU. Knepper.
CARTHAGE. Murto.
CLAYTON. Haertter.
COLUMBIA. Callaway, Ingold, Robinson, Wahlin, Westfall.
FAYETTE. Fleet.
FULTON. Christian, Sweazey.
KANSAS CITY. Cutting, Pierson.
KIRKSVILLE. Cosby, Jamison.
KIRKWOOD. Harris.
MAYSVILLE. Saunders.
PARKVILLE. Wells.
ROLLA. Hinsch.
ST. CHARLES. Karr.
ST. LOUIS. Brick, Buell, Case, Dunford, Dunkel, Grummann, Huntington, King, Middlemiss, O'Donnell, Osborn, Rider, Roever, Siroky, E. Stephens, J. Y. Stephens.
SPRINGFIELD. Finkel, H'Doubler.
WARRENSBURG. Scarborough.
WEBSTER GROVES. Clarke, Pennell.

MONTANA. (5)

BOZEMAN. Hurst.
HELENA. Canning.
MISSOULA. Carey, Lennes, Merrill.

NEBRASKA. (20)

BEAVER CROSSING. Thompson.
HASTINGS. McDill.
LINCOLN. Basoco, Brenke, Camp, Candy, Collins, Gaba, Howie, Pierce, Runge.
OMAHA. Bettinger, Campbell, Earl, Fitzpatrick, Gunn.
PERU. Hill.
WAYNE. Boyce, Hove.
YORK. Feemster.

NEVADA. (2)

RENO. Searcy, Wood.

NEW HAMPSHIRE. (18)

CONCORD. Conwell.
DURHAM. Bauer, Slobin, Wilbur.
EXETER. Butterfield, Funkhouser, Sweet.
FRANCONIA. Nelson.
HANOVER. Beetle, Brown, Forsyth, Mathewson, Morgan, Perkins, Robinson, Silverman, Wilder.
PLYMOUTH. G. M. Smith.

NEW JERSEY. (50)

BELLEPLAIN. Durell.
BLOOMFIELD. Hussey.
EAST ORANGE. Nordgaard, Stanwick.
HIGHTSTOWN. Litterick.
HOBOKEN. Murray.
JERSEY CITY. J. P. Smith.
LAWRENCEVILLE. Kimball, Mikesh.
LEONIA. Gafafer.
MENDHAM. Stafford.
MONTCLAIR. Davis, Mallory.
MOORESTOWN. Wood.
NEWARK. Conkling.
NEW BRUNSWICK. Bunyan, Meder, Morris, Nelson, Walter, Wilson.
PRINCETON. Adams, Alexander, Ball, Blumenthal, Eisenhart, Flood, Gillespie, Hacker, Knebelman, Lefschetz, Lehmer, Levine, McShane, Peterson, Schmeiser, Schultz, Thomas, Torrance, Veblen, von Neumann, Walker, Wedderburn, Wilder, Willson.
SOUTH ORANGE. Loveridge.
TRENTON. Sanford, Shuster.
UNION. Brown.
WORTENDYKE. F. E. Smith.

NEW MEXICO. (11)

ALBUQUERQUE. Bauer, Graham, MacKay, Munn, Munro, Newsom.
ARTESIA. Harp.
LAS VEGAS. Roberts, Rodgers.
SILVER CITY. Mickelson.
SOCORRO. Reece.

NEW YORK. (241)

ALBANY. Alice Irene, Beaver, Birchenough, Do Bell, Lester, Lowenstein, Stokes.
ALFRED. Polan, Seidlin, Titsworth, Whitford.
ALLEGANY. McLaughlin.
ANNANDALE-ON-HUDSON. Garabedian, Phalen.
AURORA. Hollcroft, Rusk.
BALDWIN. Grove.
BELLPORT. Walsh.
BRONX. Tanzola.
BROOKLYN. Berry, Bowden, Charosh, Cowles, Deutsch, Fleisher, Francis, Griffin, Haas, Hertzler, Hildebrandt, R. A. Johnson, Karnow, Kennison, Koch, Langman, Lepowsky, Lieber, Locke, Mary Thecla, Moore, Ruderman, Schmellner, Schuyler, Thompson, Walter, Welkowitz, Whitford, Young-Woodbridge.
BUFFALO. Archer, Gehman, Harrington, Montague, Pound, Rice.
CLINTON. Brown, Carruth, Ferry, Fitch, Patterson.
CORONA. Hanson.
ELMIRA. Suffa, Wright.
FLUSHING. Lehmann.
FOREST HILLS. Walker.
GENEVA. W. H. Durfee, W. P. Durfee, Hubbs, Rood.
HAMILTON. Aude, A. W. Smith.
HOUGHTON. Davison.
ITHACA. Agnew, Barbour, Boothroyd, Carver, Dye, Gillespie, Hurwitz, B. W. Jones, Karapetoff, Paradiso, Randolph, Ranum, Snyder, Trevor.
JORDAN. Howe.
KENMORE. Brockett.
KINDERHOOK. Magee.
NEW YORK. Adams, Allen, Allison, Anderson, Archibald, Berger, Bergstresser, Berkeley, Berry, Bradley, Breckenridge, Brewster, A. B. Brown, Burgess, Bushey, G. A. Campbell, G. C. Campbell, Clark, Cooley, Doermann, Edmondson, Eisele, Farnum, Feld, Fiske, Fite, Flanders, Foster, Frank, Frankel, Fry, Fuller, Gentzler, Gill, Girard, Graham, Hall, Harper, Hawkes, Hayes, Henderson, Hill, Hirsch, Hopper, Hughes, Hurwitz, Jablonower, Joffe, P. C. Jones, Kasner, Koopman, Larkin, Linehan, MacGregor, Maiden, Miller, Mirick, Molina, Morehouse, Mullins, Paaswell, Packer, Payne, Pedersen, Penn, Peters, Pimpton, Pooler, Post, Pride, Putnam, Quilty, Raudenbush, Reddick, Rees, Reeve, Ritt, Rosinger, Saurel, Schelkunoff, W. S. Schlauch, Schub, Seely, Shaw, Shewhart, Siceloff, Simons, Skelding, D. E. Smith, R. F. Smith, R. R. Smith, Streator, Tilley, Turner, Upton, Velton, Wahlert, Walker, Walther, Webster, Wechsler, Weisner, Whelan, Whitford, Winters, Wood, Wright.
NISKAYUNA. Male.
ONEONTA. Sanford, Schoonmaker.
PARISH. Church.
POTSDAM. Waltz.
POUGHKEEPSIE. Cummings, Wells.
ROCHESTER. Betz, Byrnes, Eastham, Gale, Harding, Kimball, Long, Price, Smyth, Watkeys.
RYE. Vivian.
ST. BONAVENTURE. Nickol.
SCARSDALE. Lawton, Mac Neish, Weaver.
SCHENECTADY. Fox, Kimball, Libman, Morse, Oergel, Snyder, Ulrich, Vedder.
STATEN ISLAND. Andersen, Drago.
SYRACUSE. Campbell, Carroll, Decker, Harwood, Lindsey, Ryan, Taylor.
TROY. Crockett, McGiffert.
WEST POINT. Echols, Jones.
YONKERS. Hubert, John, Yanosik.

NORTH CAROLINA. (26)

ASHEVILLE. Peck.
CHAPEL HILL. Browne, Henderson, Lasley, Linker, Mackie.
CHARLOTTE. O. M. Jones, Woodson.
DAVIDSON. Mebane.
DURHAM. Dearborn, Dressel, Elliott, Hickson, Rankin, Roberts, Winton.
ELON COLLEGE. Amick.
GREENBORO. Barton, Pegram, Ragsdale, Strong.
GREENVILLE. Graham, ReBarker.
MARS HILL. Robinson.

WILMINGTON. Downing.
WINGATE. Hendricks.

NORTH DAKOTA. (6)

FARGO. Householder, I. W. Smith.
GRAND FORKS. Leith, Staley.
UNIVERSITY. Hitchcock.
VALLEY CITY. Meyer.

OHIO. (120)

ADA. Whitted.
AKRON. Bender.
ASHLAND. Black.
ATHENS. Reed.
BEREA. Baur, Dustheimer.
BLUFFTON. Hirschler.
BOWLING GREEN. Mathias, Overman.
CANAL WINCHESTER. Bareis.
CHILLICOTHE. Mathias.
CINCINNATI. Barnett, Brand, Hancock, Justice, Kennedy, Kersten, Kindle, Lubin, Merriman, Moore, Mullings, Rhodes, Salkover, E. S. Smith, Yowell.
CLEVELAND. Baker, Boyce, O. E. Brown, Burington, Burwell, Focke, Freas, Hadley, Johnson, Jonah, Justin, Morris, Musselman, Nassau, Oldenburger, Sauté, Simon, Thomas.
COLUMBUS. Amos, Bailey, Bamforth, Beatty, Blumberg, Crandell, Hildner, Horn, M. E. Jones, Kuhn, LaPaz, MacDuffee, Manson, Morris, Newlin, Radó, Rasor, Rickard, Shover, Singer, Toops, Walters, Wildermuth.
DEFIANCE. MacCullough.
DELAWARE. Crane, Jose, Rowland.
EAST CLEVELAND. Getchell.
FINDLAY. Roots.
GAMBIER. Allen, Bumer.
GRANVILLE. Ladner, Wiley.
HILLIARD. Weaver.
HIRAM. Clarke, Jerome.
KENT. Manchester, Rogers, Stelson.
LOUDONVILLE. Feinler.
MARIETTA. Cope, Rea.
MOUNT ST. JOSEPH. Corona.
NEW CONCORD. White.
NEW LEXINGTON. Hoops.
NORTH CANTON. Schug.
NORWOOD. Wishard.
OBERLIN. Cairns, Carr, Johnson, Sinclair, Smyth, Yeaton.
OXFORD. Anderson, Pollard, Spenceley, Tappan, Wolfe.
PAINESVILLE. Lewis.
ROSS. Haldeman.
SPRINGFIELD. Tripp.
TIFFIN. Pierce.
TOLEDO. Brandeberry, Dancer, Lemme, Mercedes, O'Toole, Winslow.
WESTERVILLE. Glover, Menke.
WILMINGTON. Spinks.
WOOSTER. Knight, Williamson, Yanney.
YELLOW SPRINGS. Dwyer.
YOUNGSTOWN. Foard.

OKLAHOMA. (27)

ADA. Knight, Wallace.
ALVA. Hall.
LANGSTON. Tinner.
NORMAN. Brixey, Court, Duval, Erwin, Hassler, G. La Fon, J. E. La Fon, McFarland, Meacham, Reaves.
SHAWNEE. Short.
STILLWATER. Allen, Barnett, Flanders, Garretson, Gundersen, H. W. Smith, Zant.
TULSA. Byrd, Veatch, West.
WEATHERFORD. McCormick.
WETUMKA. Gentry.

OREGON. (9)

ALBANY. Ramsey.
CORVALLIS. Beaty, Kirkham, McAlister, Milne, Williams.
EUGENE. De Cou.
PORTLAND. Griffin, Merriss.

PANAMA. (1)

PANAMA CITY. Linares.

PENNSYLVANIA. (130)

ALLENTOWN. Deck, Hallett.
ANNVILLE. Wagner.
BALA-CYNWYD. Sensenig.
BARNESBORO. Fisanick.
BEAVER FALLS. Cleland, McCormick.
BETHLEHEM. Ashbaugh, Cairns, Cutler, Ewing, Fort, Latshaw, Rau, Raynor, Reynolds, Shook, Smail, Van Arnam.
BRIDGEVILLE. Aberle.
BRYN MAWR. Lehr, Wheeler.
BUTLER. Robb.
CALIFORNIA. Foberg.
CARLISLE. Ayres, Landis.
COLLEGEVILLE. Clawson, Manning.
EASTON. Hall, Hatch, W. M. Smith.
ERIE. Benedicta, Wells.
GROVE CITY. Grimes.
HARRISBURG. Whited.
HAVERFORD. Gummere, Reid, Wilson.
HUNTINGDON. Hess, Shively, Stayer.
KUTZTOWN. Knedler, Kunkel.
LANCASTER. Charles, Long, Worthington.
LATROBE. Seubert.
LEETSDALE. Buker.
LEWISBURG. Gold, Lindemann, MacCreadie, Richardson.
LINCOLN UNIVERSITY. Wright.
LOCKHAVEN. S. J. Smith.
MEADVILLE. Akers, Beisel, R. E. Smith.
PHILADELPHIA. Arnold, Bond, Caris, Chambers, Constable, Davis, Evans, Kline, Latshaw, Linton, Mitchell, Partridge, Rosengarten, Rothermel, Roulton, Safford, Shohat, Spencer, Tartler, Winston.
PITTSBURGH. Baird, Calkins, Cowley, Dines, Hicks, Hoover, Johnson, Karpov, Moskowitz, Neelley, Olds, Riggs, Rosenbach, Saibel, Swartzel, Taber, Taylor, Whitman.
SCRANTON. Bertrand.
SELINSGROVE. Boeder.

SEWICKLEY. Miller.
SHIPPENSBURG. Kieffer.
SLIPPERY ROCK. Lady.
STATE COLLEGE. Cohen, Curry, Dunlap, Frink, Gordon, Gravatt, Hagen, Hamilton, Moody, F. W. Owens, H. B. Owens, Rupp, Sheffer, Shibli, Wagner, West.
SWARTHMORE. Brinkmann, Dresden, Kovalenko, Marriott, Williams.
SWISSVALE. Foraker.
UPPER DARBY. McDonough.
WASHINGTON. Atchison, Bert, Moore, Rasel, Shaub, Thomas.
YORK. Baker.

PHILIPPINE ISLANDS. (3)

LAGUNA. Salvosa.
LEYTE. Icamen.
MANILA. Jimenez.

PORTO RICO. (2)

MAYAGUEZ. Sanchez-Diaz.
SAN GERMAN. Ramos.

RHODE ISLAND. (21)

EAST GREENWICH. Sperry.
EAST PROVIDENCE. Tyler.
NEWPORT. Chase.
PROVIDENCE. Adams, Adkins, Archibald, Astrachan, Bennett, Cameron, Carlen, Currier, Gilman, Hill, Manning, Oakley, Quade, Richardson, Rosskopf, Smiley, Tamarkin, Watt.

SOUTH CAROLINA. (13)

CHARLESTON. Bond, Coleman.
COLLEGE PLACE. Weber.
COLUMBIA. Coleman, Jackson, Williams.
GAFFNEY. Thompson.
GREENVILLE. Earle.
HARTSVILLE. Reaves.
ROCK HILL. Grant, Pugh.
SALUDA. Ramage.
SPARTANBURG. Peck.

SOUTH DAKOTA. (11)

BROOKINGS, MacDougal, Miller, Wente.
FAIRVIEW. Olson.
HURON. Titt.
MITCHELL. Knox.
RAPID CITY. Bowles, Cook.
SIOUX FALLS. Fuller.
SPEARFISH. Hesseltine.
SPRINGFIELD. Hoopes.

TENNESSEE. (14)

CHATTANOOGA. Perry.
CLEVELAND. Hutto.
JACKSON. Carr.
KNOXVILLE. Bond, Ghormley.
MARYVILLE. Knapp.
NASHVILLE. Blair, S. I. Jones, N. P. Miser, W. L. Miser, Peterson, Wren.
PULASKI. Meade.
TOWNSEND. Keller.

TEXAS. (65)

ABILENE. Burnam, Tate.
ALPINE. Gilley.
AUSTIN. Banks, Batchelder, Benedict, Cooper, Craig, Decherd, Dodd, Ettlinger, Haskell, Lubben, Moore, Muller, Norbert, Robinson, Vandiver.
BORGER. May.
BROWNSVILLE. De la Garza.
CANYON. Murray.
CENTER POINT. Rees.
COLLEGE STATION. Blumberg, Edmonson, Halperin.
DALLAS. Cell, Dice, E. H. Jones.
DENTON. M. C. Brown, Hughes, Oldham.
EDINBURG. Searcy.
EL PASO. Kennedy.
FORT WORTH. Howard, Sherer.
GALVESTON. Underwood.
GEORGETOWN. Wapple.
HASKELL. Nelson.
HOUSTON. Blau, Bray, Dean, Evans, Ford, Lovett, W. A. Rees, Streetman.
LUBBOCK. Sparks, Thompson, Underwood.
NACOGDOCHES. Cross, Ferguson, Oxsheer.
PAMPA. Rice.
PRAIRIE VIEW. Randall, Turner, Wilson.
SAN ANTONIO. Hurry, McNelly, Schnepp.
STEPHENVILLE. Cromwell, McSweeny, Redden.
TYLER. Holmes.
WAXAHACHIE. Newton.
WICHITA FALLS. Adams.

UTAH. (4)

EPHRAIM. Horsfall.
SALT LAKE CITY. Gibson, Hayes, Pehrson.

VERMONT. (10)

BURLINGTON. Bullard, Butterfield, Millington, Swift, Thomas.
MIDDLEBURY. Hazeltine, Wiley.
NORTHFIELD. Dix, Holmes.
WINOOSKI. Alliot.

VIRGINIA. (42)

ASHLAND. Simpson.
BLACKSBURG. Hatcher, O'Shaughnessy, Rasche, Williams.
BLUEFIELD. Wright.
CHARLOTTESVILLE. Wade.
EMORY. Miller.
FARMVILLE. Taliaferro.
GREENWAY. Hollis.
HAMPTON. Perkins.
LANGLEY FIELD. Pinkerton.
LEXINGTON. Byrne, Paxton, Purdie, L. W. Smith.
LYNCHBURG. Berry, Larew, Pattillo, Wiggin.
MONTEREY. Colaw.
RICHMOND. Gaines, Harris, M. L. Smith, Wheeler.
SALEM. Carpenter.
SOUTH BOSTON. Patten.
STAUNTON. Taylor.
SWEET BRIAR. Morenus.

UNIVERSITY. Aylor, Blincoe, Buchanan, Echols, Linfield, Luck, Oglesby, Puckett, Sparrow.
WILLIAMSBURG. Calkins, Russell, Stetson.
WOODSTOCK. Wunder.

WASHINGTON (17).

CLARKSTON. Keeler.
OVINGTON. Benander.
PULLMAN. Butler, Isaacs.
SEATTLE. Ballantine, Carlson, Cramlet, McFarlan, Moritz, Mullemeister, Neikirk, Winger.
SPOKANE. Amos.
TACOMA. Hanawalt, Martin.
WALLA WALLA. Bratton.
YAKIMA. Whitney.

WEST VIRGINIA. (18)

ESKDALE. Todd.
HARPERS FERRY. Drew.
HUNTINGTON. Hackney.
INSTITUTE. Lacy.
INWOOD. Mish.
KEYSER. Wilson.
MONTGOMERY. W. F. Smith.
MORGANTOWN. Colwell, Davis, Eiesland, Reynolds, Stewart, Turner, Vehse.
SMITHERS. Bell.
VAN. Morris.
WHEELING. Bagby, Weimer.

WISCONSIN. (45)

BELOIT. Conwell, Huffer.
GREEN BAY. Kalcik.
MADISON. Allen, Bennett, Evans, Hart, Hartung, Ingraham, Langer, Lowney, March, Rose, Skinner, I. S. Sokolnikoff, Van Vleck, Wilson.
MILWAUKEE. Battig, Bear, Beckwith, Ericson, Evans, Knight, Ledesma, Lewandowski, Marden, Mary Felice, Norris, Parkinson, Pettit, Quarles, Rasor, Roth, Vass.
OSHKOSH. Beenken, Price.
PLATTEVILLE. Warner.
RIPON. Woodmansee.
RIVER FALLS. Eide.
SUPERIOR. C. W. Smith.
WAUKESHA. Hopkins.
WEST ALLIS. Wolf.
WEST DE PERE. De Cleene, Sromovsky.
WISCONSIN RAPIDS. McMillan.

WYOMING. (4)

LARAMIE. Barr, Bellamy, Neubauer, Rechard.

FOREIGN MEMBERS. (Other than Canada.)

ARGENTINA. (1)

BUENOS AIRES, Baidaff.

AUSTRIA. (1)

VIENNA. Putnam.

BELGIUM. (1)

LOUVAIN. Vanhee.

BRITISH HONDURAS. (1)

ORANGE WALK. Zimmerman.

BURMA. (1)

RANGOON. Campbell.

CHILE. (1)

SANTIAGO. Salas-Edwards.

CHINA. (4)

CANTON. MacDonald, Woo.
NANKING. Chang.
PEKING. Konantz.

FRANCE. (3)

LE MANS. Thébault.
PARIS. Fréchet, Hadamard.

GERMANY. (1)

GÖTTINGEN. Bond.

GREAT BRITAIN. (6)

CAMBRIDGE. Hardy, James.
DUBLIN. Rowe.
EDINBURGH. Horsburgh.
NOTTINGHAM. Piaggio.
OXFORD. Frecheville.

INDIA. (3)

ALLAHABAD CITY. Mitra.
BOMBAY. Dalal.
MADURA. Lockwood.

ITALY. (5)

BOLOGNA. Bortolotti, Pincherle.
CAGLIARI. Crudeli.
ROME. Enriques, Laboccetta.

JAPAN. (1)

SENDAI. Hayashi.

KOREA. (1)

PYENGYANG. Parker.

NEW ZEALAND. (1)

DUNEDIN. Martyn.

PALESTINE. (1)

RAM ALLAH. Tarazi.

POLAND. (1)

WARSAW. Dickstein.

PORTUGAL. (1)

LISBON. da Cunha.

SIAM. (1)

BANGKOK. Hadlock.

SOUTH AFRICA. (3)

BLOEMFONTEIN. Arndt.
JOHANNESBURG. Dalton.
RONDEBOSCH. Muir.

SOUTH AUSTRALIA. (1)
ADELAIDE. Wilton.

SWITZERLAND. (1)
FRIBOURG. Bays.
GENEVA. Fehr.
NEUCHATEL. DuPasquier.

SYRIA. (1)
BEIRUT. Jurdak.

TURKEY. (2)
CONSTANTINOPLE. Mourad.
ISTANBUL. Harshbarger.

UKRAINE. (1)
KIEFF. Kryloff.

BY-LAWS OF THE MATHEMATICAL ASSOCIATION OF AMERICA (INCORPORATED)

Article I—Name, Purpose and Corporate Seal

1. This organization shall be known as

The Mathematical Association of America (Incorporated)

2. Its object shall be to assist in promoting the interests of mathematics in America, especially in the collegiate field, by holding meetings in any part of the United States or Canada for the presentation and discussion of mathematical papers, by the publication of mathematical papers, journals, books, monographs and reports, by conducting investigations for the purpose of improving the teaching of mathematics, by accumulating a mathematical library and by coöperating with other organizations whenever this may be desirable for attaining these or similar objects.

3. The Corporate Seal of the Association shall have inscribed thereon the name of the Association and the words "Corporate Seal—Illinois."

Article II—Membership

1. Any person who is interested in the field of collegiate mathematics shall be eligible for election to membership in the Association.

2. Any institution in which the Calculus is regularly taught shall be eligible for election to institutional membership in the Association. Such an institution shall have the privilege of sending a voting delegate to the meetings of the Association.

3. Election to membership shall be by vote of the Board upon written application from the individual or institution seeking admission, endorsed in the case of individuals by two members of the Association.

4. Those who were admitted to membership in The Mathematical Association of America (unincorporated) prior to October 1, 1920, and were in good standing as such on that date, were thereby admitted to membership in this Association (Incorporated).

Article III—Board of Trustees and Officers

1. The Officers of the Association shall be a President, two (2) Vice-Presidents, a Secretary-Treasurer, a Librarian and three (3) members of a Committee on Official Journal.

2. The control and management of the affairs and funds of the Association shall be vested in a Board of twenty (20) Trustees (hereinafter called the "Board"), who shall be members of the Association. This Board shall consist of the officers of the Association and twelve (12) additional members.

3. The President shall be elected by the Association's members biennially for a term of two years and shall be ineligible for reëlection. The Vice-Presidents shall be elected by the Association's members annually for a term of one year, and four members of the Board shall be elected by the Association's members annually for a term of three years. They shall be eligible for reëlection, but not for more than two (2) consecutive terms. The Secretary-Treasurer, the Librarian, and the Committee on Official Journal, consisting of the Editor-in-Chief, the Manager and one other member, shall be appointed by the Board. All Officers and other Trustees shall hold over until their respective successors are elected or appointed and qualify.

4. The Board shall transact the official business of the Association and shall report its actions at the annual business meeting of the Association and in the official journal. A statement regarding any proposed action of the Board which makes or alters a question of policy shall be published in the official journal, or notice of such proposed action shall be mailed to each member, before final action has been taken, so that members of the Association may make known to the Board their individual views.

5. The Board shall have authority to fill vacancies *ad interim* in any office, including vacancies in the Board and in the Committee on Official Journal, and to make any other appointments necessary for the transaction of the business of the Association.

6. At all meetings of the Board of Trustees a quorum shall consist of not less than five (5) members and no business may be validly transacted at a meeting at which less than a quorum is present; *provided* that any meeting of the Board, whether or not a quorum be present, may be adjourned to a specified time and place by a majority of the members present without notice to the members at large other than announcement of such meeting. Informal action based on a mail ballot by the members of the Board, if ratified at a properly convened meeting of the Board, shall be as valid and effective as if originally authorized at such meeting.

7. Approximately two months before the date of the annual meeting all members shall be given an opportunity to nominate by mail a candidate for each office to be filled by the members for the ensuing year. Approximately one month before the annual meeting the Board shall announce two candidates for each office to be filled by the members, one being the person who received the highest vote in the nominations and the other being selected from among the several nominees next in order. The election shall be by mail or in person and shall close on the day of the annual meeting.

8. The President shall be the Executive Officer of the Association, shall preside at all meetings of the Board of Trustees and at the annual meeting of the Association. He shall have the usual duties pertaining to his office and such other duties as may from time to time be assigned him by the Board of Trustees.

9. The Vice-Presidents shall, in the absence of the President, have and exercise the powers of the President, their order being determined alphabetically. The Board of Trustees may assign to the Vice-President such duties as may from time to time be determined.

10. The Secretary-Treasurer shall have the usual duties pertaining to the Office of Secretary and of Treasurer, including the custody of the records of the Association and of its Corporate Seal, the keeping of minutes of the meetings of the Board of Trustees and of the annual meeting and special meetings of members, and giving of due notice of all regular and special meetings of the Association and of the Board of Trustees and the supervision and safe-keeping of the funds of the Association. The Secretary-Treasurer shall also have the duty of seeing that whenever Trustees are elected, including the election of Trustees to fill vacancies a Certificate, under the Seal of the Association, giving the names of those elected and the term of their office, shall be recorded in the Office of the Recorder of Deeds for Cook County, Illinois. Such Certificates shall be signed by the Secretary-Treasurer and verified by oath of the President.

11. The Committee on Official Journal shall have supervision of the official journal subject to the control of the Board of Trustees.

12. The Librarian shall have general charge of the library of the Association and shall direct its affairs, including the exchange of the publications of the Association, subject to the control of the Board.

Article IV—Meetings

1. A meeting of the Association shall be held annually, at such time and place as the Board may direct. Special meetings of the Association may be called from time to time by the Board, or while the Board is not in session by the President of the Association, to be held at such time and place as may appear from the call.

2. The outgoing Board shall hold a meeting immediately preceding the annual meeting of the Association next succeeding their election, and the members of the new Board shall hold a meeting and organize, by completing the Board, immediately succeeding the annual meeting of the Association at which the new members thereof were elected. Further meetings of the Board may be held from time to time at the call of the President or of any three (3) members of the Board.

3. Notice of any meeting of members of the Association shall be given by the Secretary-Treasurer at least thirty (30) days prior to the date set for each meeting. Notice of all meetings of the Board other than the regular meetings, provided in Section 2 shall be given to each member of the Board at least fifteen (15) days prior to the date set therefor.

4. Any member of the Association or of the Board may waive notice with the same effect as if due notice had been given him.

5. At all meetings of the Association a quorum shall consist of not less than twenty-five (25) members and no business may be validly transacted at a meeting at which less than a quorum is present; *provided* that any meeting of the Association, whether or not a quorum be present, may be adjourned to a specified time and place by a majority of the members present without notice to the members at large other than the announcement at such meeting.

6. Members may take part and vote in person or by proxy at all meetings of the Association.

Article V—Sections

1. Any group of not less than ten (10) members of this Association may petition the Board for authority to organize a Section of the Association for the purpose of holding local meetings. The Board shall have power to specify the conditions under which such authority shall be granted.

2. The Association shall not be obligated to pay from its treasury any of the expenses of such Sections.

Article VI—Official Publications

1. The Association shall publish an official journal, which shall be sent free to all members of the Association in accordance with Article VII.

2. The Board shall have full control of the publication and sale of the official journal and of all other official publications.

3. The official journal shall be under the general management of the Committee on Official Journal. There shall also be appointed by the Board a body of Associate Editors who shall give assistance in connection with the official journal and under the direction of the Committee on Official Journal.

4. The Board shall from time to time, as the need arises, make special provision for the management of any other official publications.

5. The Board shall fix the price of the official journal and of any other official publications of the Association, but in no case shall the journal be sold to non-members for less than the annual dues of individual members.

Article VII—Dues

1. Individual members of the Association shall pay an initiation fee of Two Dollars ($2) at the time of election.

2. The annual dues of each individual member shall be Four Dollars ($4), including a subscription to the official journal.

3. The annual dues of each institutional member shall be Seven Dollars ($7), including two (2) subscriptions to the official journal.

4. All dues shall be payable on the first of January of each year. Should the annual dues of any member remain unpaid beyond a reasonable time, his name shall be dropped from the list after due notice.

5. New members entering the Association after April 1 of any year shall have their dues pro-rated for the balance of the year, except when they desire to receive the full current volume of the official journal.

6. The life membership fee shall be the present value, according to McClintock's Male Annuitant Table based upon four (4) per cent interest, of an annuity due of Four Dollars ($4) a year at the attained age of the member; an annual valuation of the life membership fund shall be made under the McClintock Male Four (4) Per Cent Table; and the reserve thus computed shall be held as a liability.

Article VIII—Amendments to the Articles of Association and By-Laws

1. Changes in the Articles of Association or amendments to the By-Laws may be made at any annual meeting of the Association, or at any adjourned session thereof, or at any special meeting of the Association called for such purpose, by a two-thirds ($\frac{2}{3}$) vote of those present and entitled to vote; *provided* that due notice concerning such amendment shall have been printed in the official journal, or mailed to each member, at least one (1) month before the date of such meeting.

2. No changes in the Articles of Association shall have legal effect until a certificate thereof, verified by oath of the President and under Seal of the Association, attested by the Secretary-Treasurer, shall be filed in the office of the Secretary of State of the State of Illinois and recorded in the office of the Recorder of Deeds for Cook County, Illinois.

PERIODS OF SERVICE OF THE OFFICERS OF THE ASSOCIATION

PRESIDENTS

E. R. HEDRICK 1916
FLORIAN CAJORI 1917
E. V. HUNTINGTON 1918
H. E. SLAUGHT 1919
D. E. SMITH 1920
G. A. MILLER 1921
R. C. ARCHIBALD 1922
R. D. CARMICHAEL 1923
H. L. RIETZ 1924
J. L. COOLIDGE 1925
DUNHAM JACKSON 1926
W. B. FORD 1927–1928
J. W. YOUNG 1929–1930
E. T. BELL 1931–1932
ARNOLD DRESDEN 1933–

VICE-PRESIDENTS

E. V. HUNTINGTON 1916
G. A. MILLER 1916
D. N. LEHMER 1917, 1918
OSWALD VEBLEN 1917
J. W. YOUNG 1918, 1926
R. G. D. RICHARDSON 1919
H. L. RIETZ 1919
HELEN A. MERRILL 1920
E. J. WILCZYNSKI 1920
R. C. ARCHIBALD 1921
R. D. CARMICHAEL 1921, 1922
B. F. FINKEL 1922
A. B. CHACE 1923
L. P. EISENHART 1923
J. L. COOLIDGE 1924
DUNHAM JACKSON 1924, 1925
A. A. BENNETT 1925, 1933
W. B. FORD 1926
A. J. KEMPNER 1927, 1928
CLARA E. SMITH 1927
F. D. MURNAGHAN 1928
E. T. BELL 1929, 1930
W. C. GRAUSTEIN 1929, 1930
ARNOLD, DRESDEN 1931
C. N. MOORE 1931
W. H. BUSSEY 1932
G. C. EVANS 1932
E. B. STOUFFER 1933

SECRETARY-TREASURER

(Appointed by the Trustees after 1918)

(W. D. CAIRNS 1916–

COMMITTEE ON OFFICIAL JOURNAL

(Appointed by the Trustees.)

H. E. SLAUGHT 1916–
R. D. CARMICHAEL 1916–1918
W. H. BUSSEY 1916–1918
R. C. ARCHIBALD 1919–1921
W. A. HURWITZ 1919–1921
A. A. BENNETT 1922
H. P. MANNING 1921–1922
W. B. FORD 1923–1925
J. L. COOLIDGE 1923
A. J. KEMPNER 1924–
W. H. BUSSEY 1926–1931
W. B. CARVER 1932–

ELECTED MEMBERS OF THE BOARD

D. N. LEHMER 1916–1918, 1922–1924, 1930–1932
R. E. MORITZ 1916–1918
K. D. SWARTZEL 1916
OSWALD VEBLEN 1916, 1920–1922, 1926–1931
R. C. ARCHIBALD 1916–1917, 1923–1930
FLORIAN CAJORI 1916, 1918–1923, 1926–1930
M. B. PORTER 1916–1917
J. W. YOUNG 1916–1917, 1920–1922
B. F. FINKEL 1916–1921, 1930–
E. H. MOORE 1916–1921, 1923–1928
ALEXANDER ZIWET 1916–1918
E. R. HEDRICK 1917–1922, 1924–1929, 1932–
J. N. VAN DER VRIES 1916–1918
HELEN A. MERRILL 1917–1919
D. E. SMITH 1917–1919, 1921–1926
ELIZABETH B. COWLEY 1918–1920
G. A. MILLER 1918–1920, 1922–1924
E. J. WILCZYNSKI 1918–1919, 1922–1926
L. P. EISENHART 1919–1922, 1925–1930
E V. HUNTINGTON 1917, 1919–1927, 1933–
E. L. DODD 1920
R. D. CARMICHAEL 1920, 1924–1929
A. A. BENNETT 1921, 1930–1932
H. L. RIETZ 1921–1923, 1925–1930
C. F. GUMMER 1921–1925
DUNHAM JACKSON 1923–1929
CLARA E. SMITH 1923–1925
A. B. CHACE 1924–1925
J. L. COOLIDGE 1926–1931
E. T. BELL 1927–1928
E. P. LANE 1928–1933
W. B. FORD 1929–
E. R. SMITH 1929
W. L. HART 1930–
LAO G. SIMONS 1930–1931
L. L. DINES 1931–
T. C. FRY 1931–
J. W. GLOVER 1931–
H. E. BUCHANAN 1932–
W. R. LONGLEY 1932–
E. J. MOULTON 1933–

INDEX TO VOLUME XLI, 1934

THE AMERICAN MATHEMATICAL MONTHLY

By R. G. SANGER, The University of Chicago

PAPERS, REPORTS OF MEETINGS

American Statistical Association. Collegiate Training in Mathematical Statistics, 598–599.

Association of Teachers of Mathematics in New England. Recommendations concerning demonstrative geometry and advanced mathematics, 344–346.

BATEMAN, H. Selective functions and operations, 556–562.

BELL, E. T. The place of rigor in mathematics, 599–607.

——— Exponential numbers, 411–419.

CAMERON, R. H. See Paradiso, L. J.

CHURCH, A. The Richard Paradox, 356–361.

COE, C. J. Displacements of a rigid body, 242–253.

CONKWRIGHT, N. B. The method of undetermined coefficients, 228–232.

COOLEY, E. F. See Robinson, Robin.

COOLIDGE, J. L. The rise and fall of projective geometry, 217–228.

COURT, N. A. Notes on the orthocentric tetrahedron, 499–502.

DICKSON, L. E. A new method for universal Waring theorems with details for seventh powers, 547–555.

ERDÖS, P. and TURÁN, P. On a problem of the elementary theory of numbers, 608–611.

FEJER, L. On the characterization of some remarkable systems of points of interpolation by means of conjugate points, 1–14.

FELD, J. M. Analytic curves for which the chord equals the arc, 543–546.

FRY, T. C. Fundamental concepts in the theory of probability, 206–217.

GRAVES, L. M. A proof of the Weierstrass condition in the calculus of variations, 502–504.

GREEN, H. G. and PRIOR, L. E. Systems of triadic points on a cubic, 253–255.

GUTTMAN, S. On cyclic numbers, 159–166.

HART, W. L. Student placement in secondary mathematics, 611–619.

HUNTINGTON, E. V. The postulational method in mathematics, 84–92.

JACKSON, D. A proof of Weierstrass's theorem, 309–312.

——— The convergence of Fourier series, 67–84.

JAMES, G. On Fermat's last theorem, 419–424.

LEVI-CIVITA, T. The secular effect of tides on the motion of planetary systems, 279–296.

Mathematical Association of America. Activities of the commission on the training and utilization of advanced students in mathematics, 201. A conference of the officers and committee members of the National Council of Teachers of Mathematics and the Mathematical Association of America, W. D. CAIRNS, 137–139. Eighteenth annual meeting, W. D. CAIRNS, 123–137. Eighteenth summer meeting, W. D. CAIRNS, 531–536. Election to membership, W. D. CAIRNS, 1, 131, 341–342, 535–536. Modifications in the award of the Chauvenet prize, 139–140.

Mathematical Association of America, Sections of. Indiana, May meeting, P. D. EDWARDS, 593–596. Iowa, April meeting, C. GOUWENS, 478–481. Kansas, March meeting, LUCY T. DOUGHERTY, 405–407. Kentucky, May 1933 meeting, A. R. FEHN, 202–205. Louisiana-Mississippi, March 1933 meeting, DEBORAH MAY HICKEY, 206; March 1934 meeting, DOROTHY MCCOY, 473–475. Maryland-District of Columbia-Virginia, December 1933 meeting, F. M. WEIDA, 140–142; May 1934 meeting, F. M. WEIDA, 484–485. Michigan, March 1934 meeting, W. L. AYRES, 470–472. Minnesota, May 1933 meeting, A. L. UNDERHILL, 62–64; May 1934 meeting, A. L. UNDERHILL, 596–598. Nebraska, April meeting, J. M. HOWIE, 481–484. Ohio, April meeting, R. CRANE, 475–477. Oklahoma, February meeting, E. F. ALLEN, 469–470. Philadelphia, December 1933 meeting, P. A. CARIS, 61–62. Rocky Mountain, April meeting, A. J. LEWIS, 536–538 Southern California, March meeting, P. H. DAUS, 342–343. Southeastern, April 1933 meeting, H. A. ROBINSON, 64–67; March 1934 meeting, H. A. ROBINSON, 407–410. Texas, May meeting, N. EDMONSON, 540–543. Wisconsin, May meeting, MAY M. BEENKEN, 538–540.

METZLER, W. H. A new theorem concerningt he rank of a matrix, 607–608.

National Council of Teachers of Mathematics. A conference of the officers and committee members of the National Council of Teachers of Mathematics, and the Mathematical Association of America, W. D. CAIRNS, 137–139.